

## Higher Pay for Car Salesmen is Management Problem

*Remedy at present seems to lie in incentives which will  
attract and hold men of greater ability.*

By John C. Gourlie

THE average automobile salesman, recent surveys tend to show, earns considerably less than \$3,000 a year, apparently an insufficient level in a period when industries competing with the automobile industry for a larger share of the consumer's dollar are pouring an ever greater proportion of their resources into high - pressure selling campaigns calling for the highest caliber of individual salesmanship.

But the same studies also make it clear that there is plenty of opportunity for able men to earn an adequate return for their efforts at selling automobiles, indicating that what is necessary is not an indiscriminate advance in the compensation of salesmen, but better incentives and better management, to the end that men qualified to do the job properly will be attracted and held. It is the rapid turnover of men improperly selected, insufficiently trained and paid on unsound compensation systems that is the core of the problem.

The surveys were undertaken by *Automotive Industries* and other Chilton Class Journal Co. publications in the endeavor to uncover

some of the facts in a situation that is being widely discussed by factory executives, a few of whom have developed figures showing the compensation of dealers handling their own lines but are not in position to know directly conditions in competing lines.

One of the accompanying tables shows payment last year to the salesmen of 34 dealers in almost as many cities. The representation is not large numerically, but is well diffused territorially, and as will be shown, the result checks remarkably close with those obtained from other studies. The averages obtained, furthermore, are not likely to be too low, since it is reasonable to assume that the better type of dealer, with the best paid salesmen, would be most apt to have figures of this character readily available for reply to a questionnaire.

By way of obtaining a better idea of compensation in the small towns, a personal canvass was made over a large section of Pennsylvania, and this tabulation is also presented herewith. As might be expected, the average in the small town dealerships is somewhat

Reports of Salesmen's 1927 Incomes From  
34 Dealers

City	Salesmen	Lowest	Highest	Average
Denver .....	7	\$1,383.02	\$3,429.68	\$2,606.88
Atlanta .....	2	1,200.00	4,500.00	2,850.00
Salt Lake .....	15	1,570.80	4,072.68	2,576.76
New York .....	15	3,188.68	4,358.61	3,850.40
Olympia (Wash.) ..	5	1,185.00	1,950.00	1,545.00
Rochester .....	9	1,100.00	4,600.00	1,600.00
Buffalo .....	10	1,500.00	3,600.00	2,500.00
Binghamton .....	4	1,164.00	2,652.00	1,548.00
Atlanta .....	10	1,500.00	5,200.00	2,800.00
St. Louis .....	22	1,500.00	6,600.00	2,600.00
Des Moines .....	5	1,175.00	3,745.00	2,755.00
Seattle .....	6	1,300.00	6,700.00	2,821.00
Miami .....	6	3,000.35	3,758.74	3,100.00
Boston .....	12	2,100.00	4,400.00	2,800.00
Birmingham .....	11	1,708.71	3,809.30	2,719.52
New Orleans .....	12	1,000.00	4,000.00	2,000.00
Cleveland .....	10	1,926.00	3,695.00	2,225.00
St. Paul .....	8	2,109.00	3,465.00	2,617.00
Boston .....	10	2,486.96	3,426.74	3,054.63
Roanoke .....	6	1,200.00	2,600.00	1,750.00
Seattle .....	20	1,800.00	4,172.00	2,077.00
Mobile .....	3	1,200.00	3,000.00	1,800.00
Birmingham .....	20	1,000.00	2,400.00	1,800.00
Minneapolis .....	8	600.00	3,600.00	1,500.00
Los Angeles .....	30	.....	.....	3,336.00
San Francisco .....	20	3,130.63	7,382.91	3,600.00
Charlotte .....	7	1,450.00	4,400.00	2,150.00
Kendalville, Ind..	2	500.00	1,400.00	950.00
Boston .....	15	1,200.00	7,000.00	1,800.00
Toledo .....	10	1,750.00	6,495.00	2,681.00
St. Louis .....	8	2,500.00	7,500.00	3,725.00
St. Louis .....	25	1,800.00	3,600.00	2,500.00
Dayton .....	12	1,750.00	5,700.00	2,750.00
Philadelphia .....	30	4,000.00	14,000.00	6,000.00
Average .....		\$1,690.24	\$4,683.29	\$2,558.47

lower, but this is due to the scaling down of the "highest" classification rather than the "lowest." In a small dealership the proprietor is usually the star salesman. The fact that the lowest paid men average higher compensation than those similarly situated in the cities is probably due to the greater stability of employment. The floater class of salesman is largely confined to the metropolitan areas.

The grand average for large and small points covered is, lowest, \$1,863.83; highest, \$3,807.74, and average, \$2,490.52.

#### Survey of Newark Dealers

Another analysis, that of the Newark Automobile Trade Association covering 21 dealers in the Newark area, showed an average return for all salesmen last year of \$2,945, which is reasonably close to the figures obtained in the broader surveys.

The Newark study sheds some valuable light on the important matter of turnover. Although 428 salesmen were employed during the year, only 116 of them stayed in the same place the full period, or slightly more than 27 per cent. Naturally those who stayed averaged better compensation. For the 16 Newark dealers selling medium and low-priced cars, the permanently employed salesmen averaged \$3,407; and for the five dealers selling higher priced cars the permanently employed men averaged \$5,261. The latter figure is almost double the average for the men who quit or were with the dealer less than a year. (Earnings for men employed less than a year are adjusted to a yearly basis.)

Taking only the permanently employed men, it is seen that 30 per cent of the salesmen for the medium and low-priced lines earned more than \$4,000 a year, while 72.9 per cent of those selling high-priced lines were above the \$4,000 mark. There were three men who earned more than \$10,000 last year. Viewed in this manner, the rewards possible for a steady worker do not appear unattractive, but the fact remains that the average compensation of automobile salesmen, judged by almost any of the current standards, is low.

For instance, the Dartnell Corp., Chicago, recently made a report on the earnings of salesmen in other than automotive lines. Some of the figures follow:

Average	Increase or Decrease Since 1923	Commis- sion %
Vacuum Cleaners .....\$1,750	Same	20
Typewriters ..... 2,600	Increase	10-20
Oil Burners ..... 3,750		5-10
Storage Batteries ..... 4,000	Decrease	5
Securities ..... 4,000		
Washing Machines ..... 4,200	Same	10-15
Adding Machines ..... 4,800		22½
Machinery ..... 5,000	Increase	2-5
Refrigerators ..... 5,000	Increase	7-20

In only two of the lines covered, it will be noted, are earnings clearly less than the average for automobile salesmen. It is such considerations as these that have turned the spotlight of study on methods of hiring, training and compensating salesmen.

The dealers themselves are fully alive to the average inadequacy of salesmen's compensation. The following letter from a *Motor Age* reader is typical in spirit, though not in detail, to a number received while the survey was being made:

"Volumes could be written on the subject of the earnings of automobile salesmen. We feel that it is very fortunate that the earnings of automobile salesmen have been permitted to sing to the low scale that

#### Compensation of Salesmen for Small Town Dealers

City	Salesman	Lowest	Highest	Average
West Chester, Pa. ....	6	\$600	\$2,500	\$1,500
West Chester, Pa. ....	1	3,390	3,390	3,390
Doylestown, Pa. ....	2	1,800	2,400	2,100
Easton, Pa. ....	6	3,200	4,200	3,675
Doylestown, Pa. ....	2	1,700	2,300	2,000
Media, Pa. ....	3	1,500	2,700	2,250
Media, Pa. ....	1	2,300	2,300	2,300
Media, Pa. ....	2	1,800	2,150	1,975
Rising Sun, Md. ....	1	1,550	1,550	1,550
Oxford, Pa. ....	2	1,500	2,000	1,750
Elkton, Md. ....	2	1,750	2,000	1,875
Downingtown, Pa. ....	1	1,800	1,800	1,800
Coatesville, Pa. ....	2	2,374	2,945	2,662
Lancaster, Pa. ....	10	2,000	5,000	3,200
Lancaster, Pa. ....	1	3,500	3,500	3,500
Coatesville, Pa. ....	2	1,750	2,100	1,925
Lancaster, Pa. ....	4	1,000	2,500	1,750
Coatesville, Pa. ....	2	1,200	1,500	1,350
Easton, Pa. ....	7	1,500	4,200	2,000
Easton, Pa. ....	3	750	3,000	1,900
Doylestown, Pa. ....	3	1,000	2,000	1,450
Elkton, Md. ....	2	1,750	2,250	2,000
Media, Pa. ....	1	2,500	2,500	2,500
Oxford, Pa. ....	2	1,500	2,500	2,000
Bethlehem, Pa. ....	1	3,350	3,350	3,350
Bethlehem, Pa. ....	5	2,100	4,200	3,000
Bethlehem, Pa. ....	4	3,000	3,900	3,400
Allentown, Pa. ....	8	2,500	4,100	3,300
Allentown, Pa. ....	2	2,800	3,300	3,100
Allentown, Pa. ....	6	3,000	4,300	3,400
Allentown, Pa. ....	6	2,700	4,500	3,200
Average .....		\$2,037.42	\$2,932.25	\$2,422.58

they have during the last few years.

"We in the motor car business are handling a very difficult sales situation. In the first place we are handling a high-priced piece of merchandise with an established price, with the keenest sort of competition. Coupled with that is the need in almost every sale of making a purchase from your new car buyer.

"Speaking broadly, the class of men now engaged in this difficult sales work are of too low a caliber to make the proper impression on prospective motor car buyers.

#### Too Many Incompetents

"In our humble judgment there are more incompetent salesmen in the automobile business than we have any use for. They are wasting their own time, and their employers' money. The correction, we believe, is less men of a higher caliber, to be paid with some regard to what they could earn in other lines of endeavor with the same degree of intellinence and energy.

"While it is undoubtedly true that 10 men can sell more automobiles than five, it is just as true that 10 men cannot sell twice as many automobiles as five unless the size of the dealer's business requires the services of 10 men in order to properly cover his clientele and new inquiries. If this statement be correct, then it is obvious that by having 10 men on a given force where five can cover the field, that the dealer is either going to lose money because of too high a sales cost, or the 10 salesmen will be so poorly paid that their efficiency will be reduced and they will eventually drift off to something else."

Very seldom is a suggestion made that salesmen ought to receive more payment for given results than is the practice now. It is felt that the current return of approximately 5 per cent on sales ought to be suffi-

cient, and that the dealer ought to be able to make the work and the payment attractive to good salesmen on this basis.

Consequently the most active progressive factories in the matter of sales promotion are seeking to help the dealer train his salesmen and offer them constant assistance and guidance in the search for prospects and the follow-up of leads. But the actual method of compensation, as distinguished from the rate, remains an important question susceptible of treatment in a number of ways, no one of which is definitely in the ascendancy.

A straight commission basis with or without drawing accounts appears to be still the most favored by dealers, although not by the factories. Usually 5 per cent on the price net is paid; occasionally the f.o.b. price is the basis. A few dealers base the commission on the cash involved, i.e., the trade-in is deducted. This is generally disfavored on the ground that it is illogical and unfair, since the trade-in should be the equivalent of cash; and that it induces the salesman to devote a disproportionate amount of his efforts to closing deals involving trade-ins of small value, whereas experience has shown that the dealer is much more apt to lose in money and good will on such vehicles than on up-to-date models in good condition.

In addition to straight commissions, the other important type of compensation is salary plus commission or bonus on sales. This is the plan now most favored by the factories, and for a number of reasons, some of which are involved in a criticism of the commission method.

Straight commissions tend to involve devastating

variations in weekly or monthly earnings and they tend to give the salesman the feeling that he is working principally for himself. Such men are likely to resent attempts at control and guidance in the best interests of the dealer. There is also the temptation to hire more men than are needed for the territory—though this is not a point that is pressed by the factories, which are inclined to urge dealers to expand their sales forces.

#### Salary Plus Commission

The salary plus commission or bonus system is held to meet the criticisms of the straight commission plan. It offers stimulation to the salesman, tends to stabilize earnings, yet permits closer relations between employer and sales representative. It is true that many of the very best salesmen are perfectly satisfied with a straight commission and would not willingly accept another basis unless they can be shown an equal chance for high compensation. This is a matter of how the plan is adjusted.

A very moderate salary is usually recommended—just for a bare living, so that the salesman is dependent on his efforts for the comforts of life. It is also held that if bonuses rather than commissions are paid in addition to salaries, the payments should be frequent enough so that the salesman will not become discouraged waiting for his additional remuneration.

Plans of this character are of course not new in the industry, and their success, as has been amply demonstrated, is largely dependent on the competence of the management. Education of the dealer along these lines is the big task of the factories today.

## Model 66 Hug Roadbuilder Announced



**T**HE Hug Co., Highland, Ill., has announced the Model 66 Hug roadbuilder which is specially designed for highway and city street maintenance work, for material yard hauling and for an all-purpose contractors' and roadbuilders' truck. The body is a 2¼-yd. power hoist body with a double acting tail gate and removable side boards. Other features of this new

model are, a 5-in. I-beam frame, a heavy-duty Buda six-cylinder truck engine, a four-speed forward transmission, a specially designed double reduction rear axle, full-floating type, and 34 x 5 tire equipment, single front and dual rear. The Model 66 is rated as a 2-ton truck with a maximum load capacity of 6500 lb. The wheelbase is 130 in.



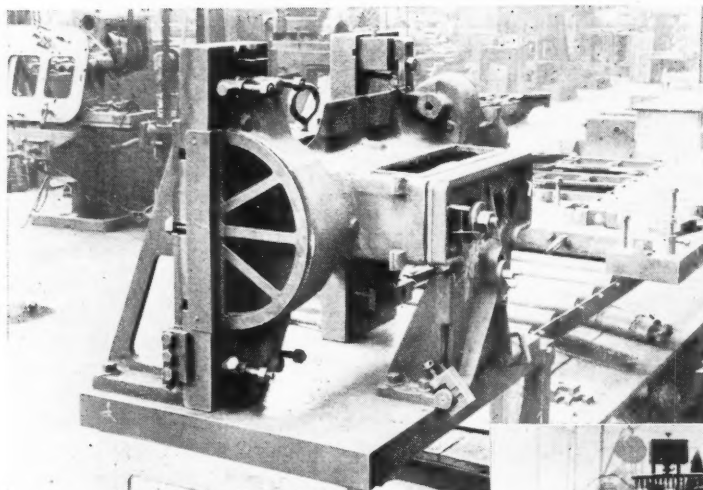


Fig. 1 (left)—Cylinder block fixture used in the Hotchkiss plant for first milling and drilling operations as well as for checking machining allowances on casting

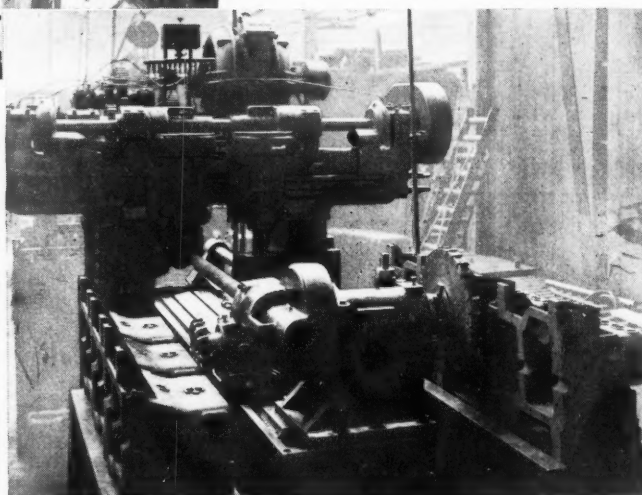


Fig. 2 (right)—In the Bean plant an Ingersoll milling machine was especially adapted to handle work ordinarily too large for it

## Many European Production Methods Applicable Here

Study of operations in foreign automobile plants brings to light interesting ideas which might be used in U. S. factories. Machining of cylinder blocks.

By K. W. Stillman

**I**N view of the relatively small output—judged by American standards—of most European automobile plants, one might be led to believe that such plants would be unlikely to employ production methods particularly applicable to American conditions or of especial interest to American production executives.

To entertain such a belief, however, is a mistake. Possibly it is because of their small production which makes frequent trials of new ideas easy and inexpensive, but whatever the reason, there are, in many European plants, satisfactory production methods in use which are quite different from American practice but which appear adaptable to our conditions.

For many months our valuable contemporary, *The Automobile Engineer*, of London, has been publishing detailed descriptions of the equipment and production methods to be found in representative British and Continental automotive plants.

*Automotive Industries* has very courteously been granted permission to extract from these articles such information as appears to be of particular value and interest to American production men.

To avoid confusion of jumping from one piece to another, this article will be confined to new and unusual European practices in the preparation and machining of cylinder blocks.

It may be said that, in general, cylinder block machining practice is similar to that employed in this country and that, in the main, the same type of machine tools are used—even the same ones, since a surprisingly large number of American machine tools are to be found in foreign plants.

Following through the usual order of operations on a block, the first item of interest is found in the plant of Henry Meadows, Ltd., which manufactures a large line of engines and transmissions. In this plant all



cylinder block castings are artificially aged before any machining is performed.

The blocks are placed five at a time on a hot plate which is maintained at a temperature of 250 deg. C., by means of gas burners. Four hours is the usual heating period, and the hot plate is located in the casting storeroom adjacent to the start of the machine line.

In the St. Denis plant of Hotchkiss et Cie., an interesting fixture is employed to locate the casting on a jig for machining the top face. (See Fig. 1.) The jig plate consists simply of a flat plate with pads to support the engine feet, and four clamps. This plate is located by tenons and bolted against the vertical faces of two angle brackets on the supporting fixture in the same way it is afterward fastened in the milling machine.

#### Location From Cylinder Bores

Location is made from the cored cylinder bores by means of expanding mandrels supported by the jig plate and a second plate on the fixture. This second plate is pivoted so that it can be swung aside for placing the casting in position.

The outer edge of the front plate registers with the profile of the cylinder head and provision is made for checking the machining allowance on the valve cover facing and the wall thickness in the water jacket wall.

Two sheet metal gages, which have the profile of the front and rear joint faces, simplify the setting, and a third gage indicates the amount of metal left around the bore of the camshaft and magneto drive shaft holes.

The jig plate is also fitted with drill bushings, so that after the first milling operation the bolt holes can be drilled and reamed for future locations before the casting is removed from the jig.

The makers of the well-known Bean cars ran against

a nice problem in adapting an Ingersoll plano-milling machine to the rough milling of the top and bottom faces of cylinder blocks which were too large to be handled in the machine in the usual way.

To do this the milling cutters are mounted on a special head on the work table as shown in Fig. 2, while the work is held in a stationary fixture along the side of the machine table. Two spindles are employed on the cutter head, each being driven independently by shafts through double reduction gears from the regular machine spindles.

A rear bearing is provided for both driving shafts and the work table is traversed forward. The work holding fixtures are supported on two auxiliary tables on each side of the machine bed. Two set-ups are made, one for the top and the second for the bottom face, the latter being machined first.

The first milling operation on Rolls-Royce cylinder blocks is also unusual because of the projecting cylinder barrels which extend beyond the bottom face and make machining around and between them rather difficult. The problem has been solved by the use of a large end mill with a roller on the shank of the tool.

This roller makes contact with the outside diameter of the barrels as the work table is traversed past the cutter so that the required profiling action is obtained. The metal which is left close up to the cylinder barrels is removed in another minor milling operation while the junction of the barrels with the joint face is finished when the outside diameter of the former are turned.

The second operation in this plant is also somewhat unusual in that three separate operations on three groups of blocks are performed simultaneously in a milling machine. In this machine the top face of the block, the tappet face and the bottom joint face are all milled.

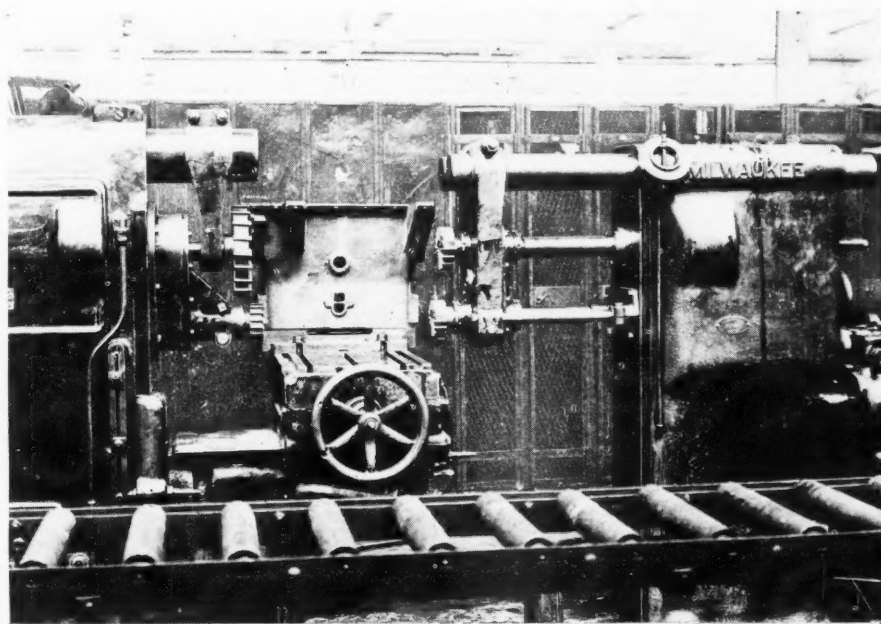
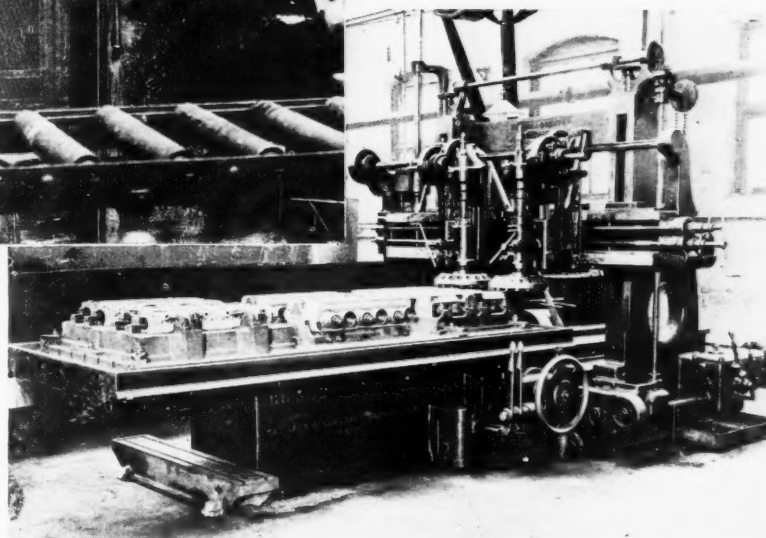
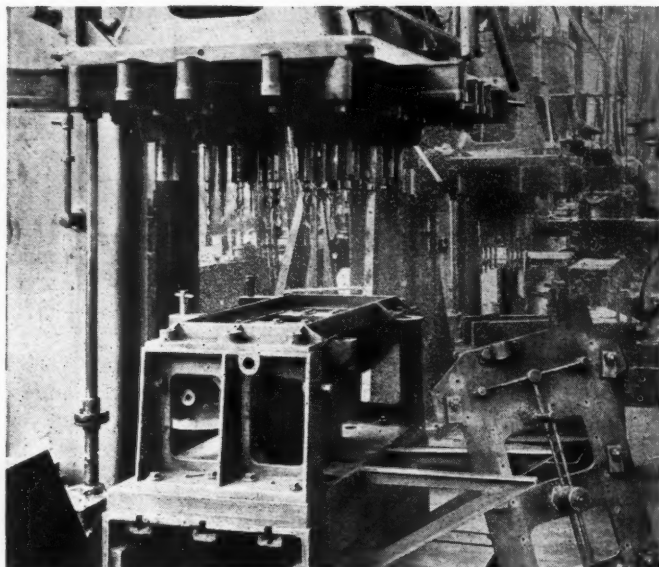


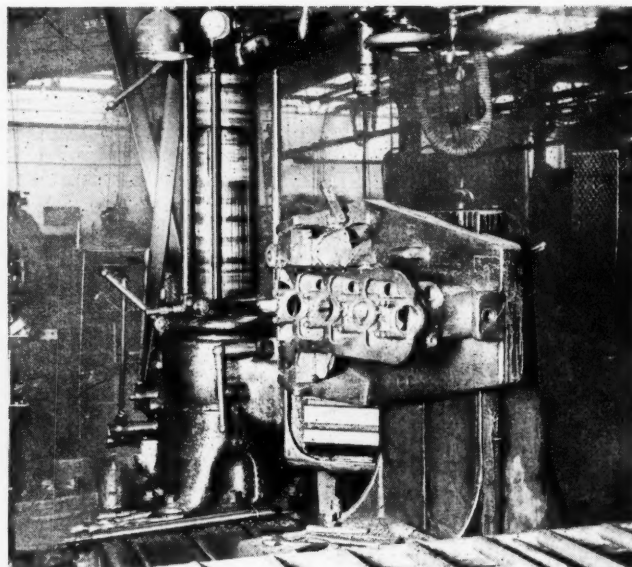
Fig. 4 (above)—Two Milwaukee milling machines are combined in the Bean plant to provide efficient duplex milling for cylinder block work

Fig. 3 (below)—In making Rolls-Royce engines this equipment is used to complete three milling operations on three groups of parts simultaneously





*Fig. 5—In the Hotchkiss plant holes in mating components are drilled with identical fixtures and spindles. This set-up is for drilling cylinder block oil pan surface and the oil pan*



*Fig. 7—Very heavy trunnion-type fixtures used in the Clement-Talbot plant permit drilling operations to be performed on all six faces of cylinder blocks*

For the first operation noted, the fixture, which holds four blocks, is made with clearance holes for the cylinder barrels so that the block is located from the previously machined joint face.

The second fixture holds four more blocks clamped up against a previously machined top joint face by means of bolts through the cylinder barrels in position for milling the tappet faces.

The third fixture, which also holds four blocks, accommodates them for machining the bottom joint face without changing the setting of the cutters. This arrangement of fixtures permits continuous operation, since it is possible to load and unload one fixture while others are under the cutters.

The main milling operations on the Bean cylinder block are carried out in four standard milling machines arranged in pairs so as to give in effect two efficient duplex millers. (See Fig. 4.) The knee and table are retained on the heavier machine of each pair while only the column, arm and cutter arbor of the other machine are retained. One work table thus saves both machines and permits both faces of the cylinder block to be milled at a single pass.

The cutters are axially adjustable to obtain correct spacing. The machines are separately driven, permitting lower speed for the large cutter. Fixture stops are provided for setting the cutters and the table in the correct position while the machines themselves are set very rigidly on concrete foundations after absolute parallelism has been obtained between their side ways.

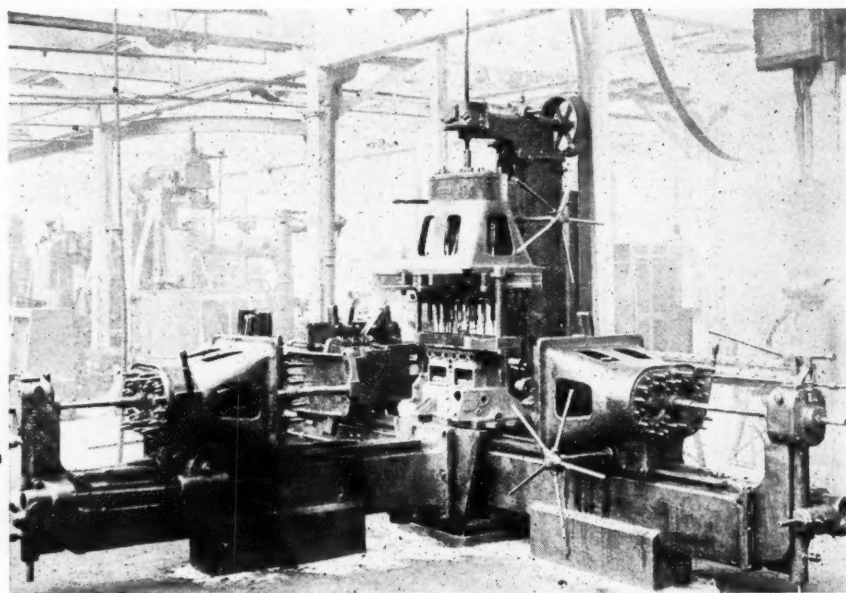
In the Hotchkiss plant, better use is made of multi-spindle drills by providing fixtures arranged for drilling both parts of mating components, such as the cylinder block and cylinder head, cover faces, transmission

case and the rear cylinder block face. (See Fig. 5.)

By this means, the spindles may be permanently set up in the drills and the only change necessary when going from one part to another is a substitution of drill sizes, taps for drills, etc.

In the plant where Delage cars are made all major drilling operations on the cylinder block are performed with the block in box type trunnion fixtures which are mounted on rails in front of the line of drilling machines. Blocks are loaded into the fixtures from the front, are clamped and can then be indexed in any one of four positions to present four sides of the block to the drills and reamers.

Another interesting drilling development is to be found in the Bean plant (Fig. 6) where special equipment has been provided for drilling the block from four directions simultaneously. Four standard multi-spindle



*Fig. 6—Bean has arranged four standard multi-spindle drills about a simple fixture to provide simultaneous four-way drilling of cylinder blocks*



drilling machines are arranged about a simple fixture and drill the cylinder head face, the manifold face, timing face and rear end in one operation.

Separate drive is provided for each machine through shafting located below the shop floor. The fixture supports and locates jig plates which are carried on pillars sliding in the head.

In the Clement Talbot plant all major drilling operations on the block are carried out with the block in a very heavy trunnion fixture which permits drilling in all six faces of the block. (See Fig. 7.)

### Trend Toward Honing

The methods employed in finishing cylinder bores in European plants vary rather widely, but in a number of them the best American practice is equaled. Grinding, reaming and broaching are still being used to some extent, but apparently the present trend is toward honing as the best means of applying the final finish.

The Delage organization has carried this development work rather far and has a very interesting honing method. The honing machines employed have two spindles and carry hones the length of which is 80 per cent of the length of the bore.

The spindles run at 100 r.p.m. and the reciprocatory motion is synchronized with them since the crank disk is driven through spiral gears from the spindles. From 0.0027 to 0.0032 in. of stock is left for removal during honing. Most of this is removed in six minutes in the roughing operation and the remainder, to tolerances of 0.0008 in. for oval and taper, is removed in two minutes floor-to-floor time in the finish honing operation.

The Hotchkiss cylinder bores are finish bored and reamed in a Hole Hog machine equipped with a special form of tool. Two single point boring tools are mounted in front of specially shaped reamer segments so that finish boring and reaming are performed at a single traverse of the work table.

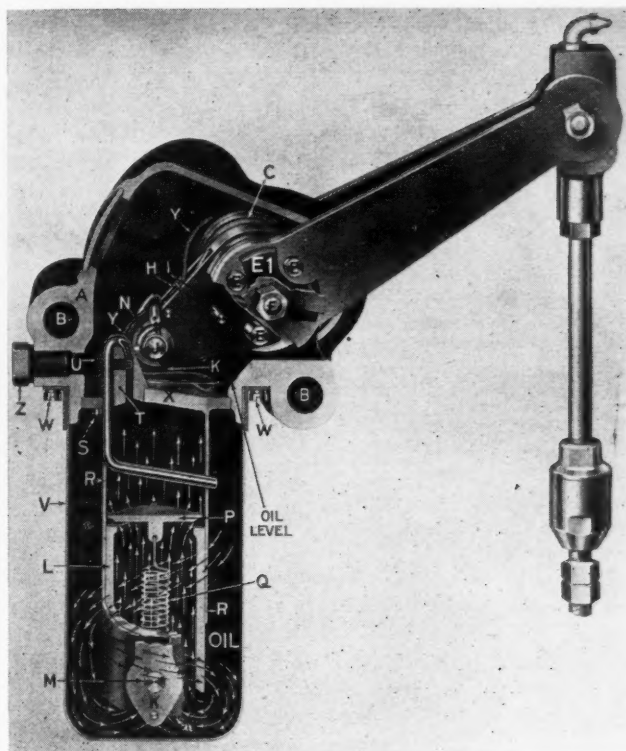
The boring tools leave about 0.012 in. for reaming and the reamers finish the bore within 0.002 in. of size. The reamer segments are four in number and consist of rectangular blocks of tool steel each having three cutting teeth. The segments are set into slots in the body of the tool holder. Final finish is obtained in a honing machine of Hotchkiss design.

## Landis Shock Diffuser

THE Landis shock diffuser, manufactured by the Landis Engineering & Mfg. Co., Waynesboro, Pa., is of the one-way type, using a rigid connecting link between the operating arm and the axle and is also featured by an adjustable by-pass. The recoil control characteristics can therefore be varied to suit all types of springs and car weights.

All external parts are Parkerized and then lacquered. All bearing surfaces are designed to automatically compensate for wear in addition to being thoroughly lubricated. To insure against oil leakage, the oil level is well below the operating arm journal, and the steel oil container is carefully machined to insure a tight fit and is installed with an oil resisting cement.

The large oil reservoir has six times the volume of the piston stroke. The supply is therefore ample for all operating conditions. There is no reversal in the direction of oil flow as the design of the by-pass nozzle and



Landis shock diffuser

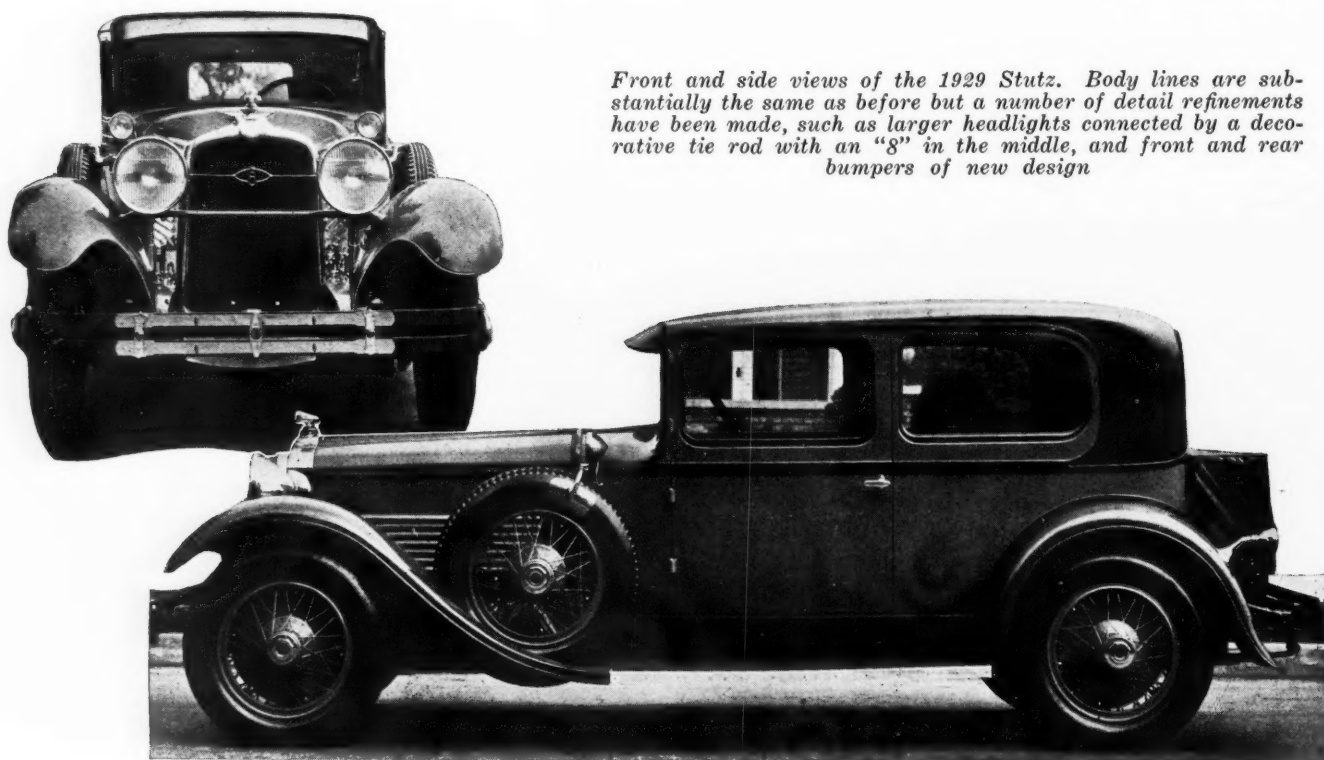
the piston with its large valve is such that the oil always travels in the same direction. The flow is rapid, aiding the radiation of any heat which may be generated. This latter action of heat dissipation is also facilitated by the thin walls of the steel oil container.

The oil, in addition to being the diffusing agent, lubricates all bearing surfaces within the device. The bearings which are not actually submerged in the lubricant are fed with wicking which dips into the reservoir. The lower universal joint in the rigid connecting link is packed with lubricant at the factory, while the upper joint is provided with a pressure fitting.

As stated before, any wear which may occur is automatically compensated for in the design. For instance, coil springs are placed behind the bronze bearing surfaces in the universal joints and any wear is taken up by the expansion of the spring. The crank journal spring N and the piston journal spring O have similar purposes in that they compensate for wear in crank journal J and the piston M respectively. Similar provision is made on the other bearing surfaces.

During compression movement of the car spring, the operating arms D are raised, which, through journal C, crank G, and yoke K, in turn pull the aluminum alloy piston L downward in cylinder R, opening valve P on head of piston L, filling the cylinder with oil. When the motion is reversed, or recoil starts, valve P closes and piston L moves upward, forcing oil through the by-pass which is adjusted at the factory to the proper size by means of the screw U so that the proper time element can be introduced for recoil movement of the car spring to be controlled. The discharge from the by-pass outlet is tangential to the inner wall of container V and at a downward angle. The rapid flow of oil from the nozzle causes a whirling motion of the oil as indicated by the arrows, forcing the main body of oil upward through the center of the container and through the center of piston L, in the direction necessary to fill the cylinder R when valve P opens.





Front and side views of the 1929 Stutz. Body lines are substantially the same as before but a number of detail refinements have been made, such as larger headlights connected by a decorative tie rod with an "8" in the middle, and front and rear bumpers of new design

## Stutz Increases Power and Makes Body Refinements

Larger valve diameter and improvements in intake manifold bring output up to 115 hp. at 3600 r.p.m. Adjustable front seats for all models. Springs redesigned.

*By M. Warren Baker*

**W**ITH refinements in engine, chassis and body, the Stutz Motor Car Co. of America, Inc., this week is presenting its new series of 1929 models. Prices remain at the same levels as formerly.

Among the engine changes is an increase in the valve diameter to 1 21/32 in. In conjunction with certain refinements in the intake manifold this enlargement of the valves has increased the brake horsepower from 112 at 3600 r.p.m., to 115.

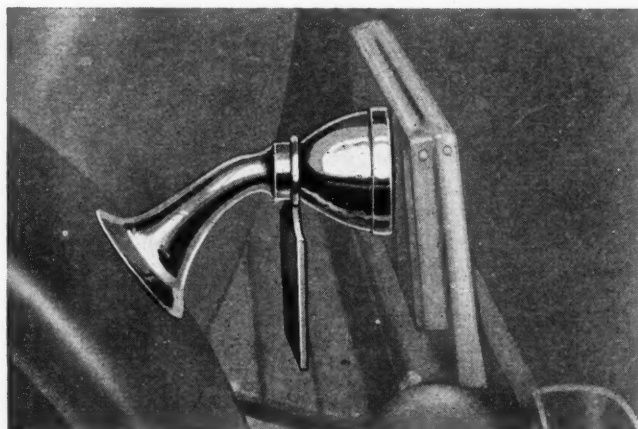
The intake manifold has been provided with an improved type of heater and the dual passages have been increased slightly in size. The wall surfaces of the passages have been smoothed, and an improved type of water thermostat has been adopted. Other engine refinements include the adoption of a new two-bearing water pump and of a Link-Belt "Blue, Streak" silent chain with automatic adjustment.

Adjustable European-type front seats, which formerly were used only on the Weymann-bodied styles, are now regular equipment on all models except the Victoria coupe and two-passenger coupe, which have adjustable seat backs not of the Weymann type.

Seats in the new cars are deeply upholstered with longer and more resilient springs. They also are slightly higher than in the previous models, giving a little more

road vision. In the center of the tonneau seat a folding and disappearing arm rest is provided. New body trim is another feature. Riding qualities are improved by the use of new springs with slightly more arch and the addition of snubber plates in front.

The gear shift lever has been carried up higher and



Stutz license plate holder and tail-light. The stop-light is mounted on the opposite side of the car

thus brought closer to the driver's hand, while the emergency brake lever has been redesigned to allow easier operation. Both levers now are capped with hardware to harmonize with the trim.

Steering gear controls have been redesigned with the horn button in the center. Throttle, spark and headlight controls still are mounted atop the steering wheel, but are of a new and more attractive design. The steering wheel itself now is adjustable as to tilt, to allow maximum road vision to the driver whether he be short or tall.

Headlamps have been made slightly larger in the new series and reflecting jewels have been placed on the sides of the lamps so that occupants may know if the lamps are functioning properly. The headlamp tie rod has been redesigned for decorative effect and in the center is a nickel-plated "8."

The rear lamp arrangement has been changed by placing the stop and reverse light on the right rear fender, while the tail-light and license bracket remain on the left rear fender.

New nickel-plated bumpers in front and bumperettes at the rear complement the body lines of the new cars. A new style, easily accessible trunk rack is fitted, and is finished to harmonize with the color of the car. The new horn has a distinctive and increased tone volume.

In addition to the instruments formerly mounted on the instrument board, a control has been placed there to operate the new muffler with by-pass valve. Running board moldings have been beautified, and improved rear-vision mirrors are being installed.

## New British Airship Details

SOME details of the design, construction and capabilities of two British State airships, which are expected to be complete and ready for trial by the end of this year, were divulged recently to a party consisting mainly of members of the press who visited the Royal Airship Works at Cardington (Bedfordshire) where one of the pair (R101) is being built.

These aircraft are intended to operate British Empire air services, in connection with which five bases with mooring masts and other ground equipment are being prepared at Cardington, at Ismailia (Egypt), Karachi (India), St. Hubert (Canada), and Durban (South Africa); in addition, sites have been acquired for similar provisions near Perth (Australia), and in New Zealand. The first four of the overseas bases are expected to be ready for use by the time the home trials of the airships are completed, viz.: in the early autumn of next year.

The chief point of difference between R101, the vessel recently inspected, and R100 (which is being built by the Airship Guarantee Co. at Howden, Yorkshire), is that the five 650 hp. Beardmore Tornado engines of the former are of the Diesel type burning heavy oil, whereas R100 has gasoline engines.

The gas capacity of R101 is 5,000,000 cu. ft. The vessel accommodates 100 passengers and is designed to give a lift of 100 tons. She will have a range of 4000 miles in still air with the ordinary commercial load at a cruising speed of 63 m.p.h., while the specification calls for a minimum speed of 70 m.p.h. at an altitude of 5000 ft. The overall length is 724 ft., with accommodation for the 100 passengers arranged on two floors stretching over 10 bays of the ship; an area of 5550 sq. ft. on the upper deck exclusive of promenades is largely devoted to a single lounge. This deck

also carries a dining-room for 50 passengers, and on the deck below is a smoke-room, while two-berth sleeping cabins are provided on both decks. Entrance for the passengers is at the nose of the ship whence a long covered-in corridor leads to the passenger quarters, in all parts of which provision has been made for heating by steam radiators.

The five power units are disposed under the hull in cars, each of which is a miniature replica of the shape of the hull supported in such a way as to allow any unit to be unshipped and replaced by another when overhauls are due. All the airscrews have blades of variable pitch, which can also be set to a neutral pitch or for reversing.

### Auxiliary Gasoline Engines

An auxiliary engine operating on gasoline is provided in each car to start up the main engine, and to drive an air compressor serving the airscrew-operated electric generator until the air stream of the vessel is sufficient for that purpose. A notable feature of the engines of R101, beyond their being of the Diesel type, is that they are provided with evaporative steam cooling which not only economizes in the weight of water but enables the steam condensing radiators to be placed anywhere in the ship and, in the case of the engines, near to the passengers' quarters, to feed the steam-heating equipments.

The production of these two new airships has proceeded and is still proceeding at a much higher rate and more economically than has been the case with other commercial airships. Each ship has special features that remain to be tested before their merits can be fully judged; one of these is the system of self-contained rings or frames of the hull which has permitted the central portion—that is, the main weight-carrying and lifting section—to be completed inside two months.

Another special feature of R101 is the system of transferring the lifting power of the gasbags to the ship; the arrangement of the wires inclosing the bags is such that under no conditions are strains or pressure imposed upon the framework except where provision is made for them, a result which, it is claimed, has not been achieved before in airship construction.

Advance has also been achieved, it is claimed, in the strength factors and in the provision for dealing with a vertical current—a dangerous gust—of about 4000 ft. per minute. It is pointed out that an airship suddenly ascending at that rate will produce a rapid expansion of the gas in the bags as the air density decreases; to counteract that tendency special valves have been arranged at the mid-height of the ship which can automatically release gas at the rate of 45,000 cu. ft. per minute. Two of these valves occur in each of the larger bags. The same valves, besides being automatic, can also be operated from the control cabin, while, in order to trim the ship, the whole of the fuel and water ballast can be blown from tank to tank throughout the length of the hull by compressed air. This combination of features is said to provide a means of control, distinct and additional to the normal elevators and rudders, which has never before been available.

Another new device consists of reefing booms between the main longitudinal girders, which can be forced out to tighten the fabric cover if it becomes slack; as a slack cover causes considerable increase in air resistance, this plan should effectively help to maintain the efficiency of the ship, while at the same time reducing the unsupported span of the fabric cover between the longitudinals.



# How Motion of a Mechanism May be Analyzed Geometrically

## Part 2—Application of the Method to Engine Valve Cams

By William Samuels

CONTINUING our discussion from last week, for the second example we will take the mechanism represented in Fig. 2—a cam with an outline composed of circular arcs, rotating around  $O_1$  and contacting with a flat plate on a rocker arm swinging around  $O_2$ . Mechanisms of this type are frequently employed for valve operation, the simple lever sometimes being replaced by a bell-crank.

This represents one of the most difficult problems for an algebraic solution, but it yields readily to the geometrical treatment. The treatment would be still further simplified if the cam were engaged by a curved plate or roller on the rocker, instead of by a flat plate. Application of the method to this particular example therefore serves to show its worth for use in connection with really difficult motions.

The writer was led to make this study by reading an article by Dipl.-Ing. Robert Kluger\* and wishes to acknowledge his indebtedness to that author. The method here given is somewhat different, however, from that of the article cited, making some of the points clearer, and the problem also has been carried through more completely.

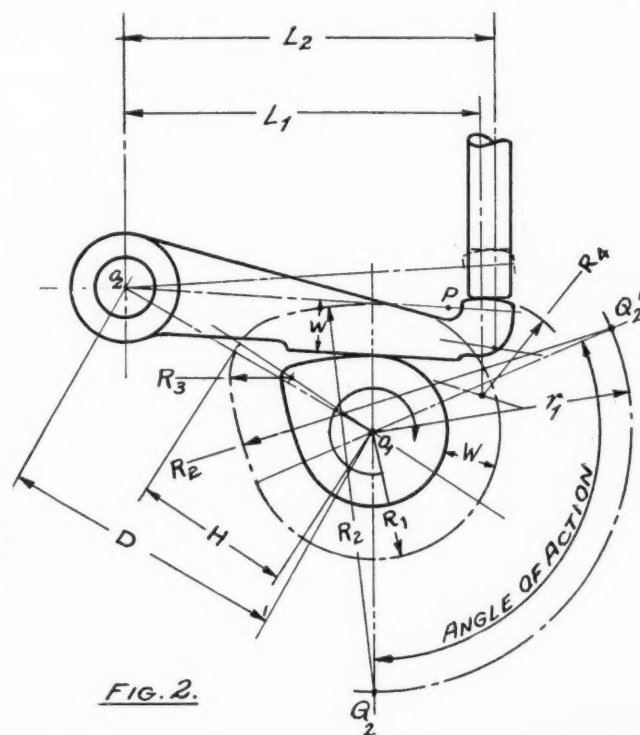
The cam in Fig. 2, shown in full line, is symmetrical and formed like a customary mushroom-follower cam with a base radius, a nose radius and two identical flank radii. We draw a line  $O_2P$  parallel to the plate surface through pivot point  $O_2$ . Let the distance between the surface and the parallel be  $W$ . Next we draw a curve all around the cam outline, having the constant radial distance  $W$  therefrom. This concentric curve is shown in a dash-dotted line. It forms an imaginary cam, each radius of which equals the corresponding radius of the actual cam plus  $W$ . This imaginary cam has the base radius  $R_1$ , the two flank radii  $R_2$  and the nose radius  $R_3$ . The height of the cam from  $O_1$  to the tip of the nose is  $H$ . The axes of both radii  $R_2$ ,  $Q_2$  and  $Q_2'$  are located at a distance  $r_1$  from  $O_1$ . The fixed distance between  $O_1$  and  $O_2$  is  $D$ .

It will be readily seen that the actual cam gives to the rocker arm the same angular movement that the imaginary cam, rotating around  $O_1$ , gives to the line  $O_2P$ , swinging around  $O_2$  and maintaining tangential contact with the imaginary cam.

The cam flank with radius  $R_2$  is a sector of an eccentric disk, rotating around  $O_1$  with an eccentricity  $r_1$  and having the disk radius  $R_2$ . Similarly, the nose portion of the cam is a sector of an eccentric disk (or, rather,

crank pin) rotating around  $O_1$  with a crank radius equal to  $H R_3$  and having a pin radius  $R_3$ . What we have to find out, then, is how a rotating eccentric disk moves a straight line swinging around point in it and contacting tangentially with the disk.

Fig. 3 represents such a motion diagrammatically.  $O_1$  is the center of the (clockwise) rotation.  $A$  is the



center of the eccentric disk, the eccentricity  $O_1A$  equaling  $r_1$ , and the disk radius equaling  $r_3$ .  $O_2$  is the center of oscillation of the straight line  $O_2E_1$ .  $B$  is the point of tangency between  $O_2E'$ .  $B$  is the point of tangency between  $O_2E'$  and the eccentric disk. Hence  $ABO_2$  is a right angle.  $AB$ , being a disk radius, equals  $r_3$ . The length of the lever arm  $O_2B$  will be denoted by  $r_2$ , and the fixed distance  $O_1O_2$  by  $r_0$ .

In our motion diagram, the length  $AB$  plays the part of a connecting rod of constant length  $r_3$ , connecting the driving lever  $r_1$  with the driven lever  $r_2$  in such a way that  $r_3$  is always perpendicular to  $r_2$ .

We now advance lever  $r_1$  through the small angle  $\Delta r_1$  from  $O_1A$  to  $O_1A'$ ,  $AA'$  equaling  $r_1\Delta\alpha_1$ . Correspondingly  $B$  advances to  $B''$ , where  $B''$  is the point of tangency

\*"Beiträge zur graphischen Ermittlung der Bewegungsgrossen von Schwinghebelsteuerungen" Der Motorwagen 1924 p. 674.



between an arc around  $A'$  of the radius  $r_3$  and a tangent on this arc through  $O_2B''A'$  again is a right angle.  $BO_2B''$  is the angular motion of the driven member,  $\angle \alpha_2$ . The tangent  $O_2B''$  intersects line  $AB$  at  $C$ .  $BC$  equals  $r_2 \Delta \epsilon_2$  and distance  $B''C$  represents the shortening of the driven lever  $r_2$  during the motion (its negative increase). Consequently  $B''C$  is denoted by  $-\Delta r_2$ .

As in our first example, we resolve the motion by disconnecting the mechanism at point  $B$  and moving connecting rod  $r_3$  parallel to itself from  $AB$  to  $A'B'$ . We have then  $BB' = AA' = r_1 \Delta \epsilon_1$ . For a sufficiently small advancement,  $B'$  is located on line  $B''C$ . By a successive angular movement we now bring  $r_3$  from its parallel position  $A'B'$  into its final position  $A'B''$ . From the geometry of the figure it follows that angle  $B'A'B'' =$  angle  $BO_2C = \Delta \alpha_2$ . Consequently  $B'B'' = r_3 \Delta \epsilon_2$ .

The length  $B''C$  also represents the magnitude of the sliding motion between disk and lever.

Thus the miniature figure  $CBB'B''$  contains the increments  $r_2 \Delta \alpha_2$ ,  $r_1 \Delta \alpha_1$ ,  $r_3 \Delta \epsilon_2$  and  $-\Delta r_2$ . The corresponding large figure, magnified in the proportion  $1/\Delta \alpha_1$ , can be found partially by drawing a perpendicular to  $AB$  through  $O_1$ , intersecting  $AB$  at  $P$ . Then triangle  $PO_1A$  is similar to  $CBB'$ , for  $PO_1 \perp CB$ ,  $O_1A \perp$

We now proceed to complete the magnified representation of miniature figure  $CBB'B''$  in which the equivalent for  $B''$  is still missing. We need to find a point  $G$  on the extension of  $PA$  at a distance  $GA$  from  $A$ , such that

$$GA = B'B'' \times (1/\Delta \epsilon_1) = r_3 (\Delta \alpha_2 / \Delta \epsilon_1) = r_3 u.$$

Let us now connect  $O_1$  and  $O_2$  by a straight line and designate the fixed distance  $O_1O_2$  by  $r_0$ .  $O_1O_2$  intersects  $AB$  at  $O_3$ . If we scrutinize the position of  $O_3$  in its relation to the parallel lines  $BO_2 (= r_2)$  and  $PO_1 (= r_2 u)$  we find that  $O_3$  has a focal position between the two parallels, in the sense that if any length is set off on the upper parallel, it is reflected on the lower parallel in the proportion of  $u$  to 1, by two rays through the ends of that length and  $O_3$ .

### Value of the Sliding Reduction

Consequently, if we transfer point  $A$  to  $O_2B$  by striking an arc of radius  $AB = r_3$  around  $B$ , intersecting  $O_2B$  at  $D$ , and draw the ray  $DO_3$ , intersecting  $PO_1$  at  $E$ , then  $PE$  equals  $r_3 u$ . Consequently, if we make  $AG$  equal to  $PE$ , then  $G$  in the magnified figure represents  $B''$  in the miniature figure. This gives to  $PG$  the value of

$$B''C (1/\Delta \alpha_1) = -\Delta r_2 / \Delta \alpha_1.$$

As  $-\Delta r_2$  represented the sliding motion between disk and lever during a short advancement, this ratio  $-\Delta r_2 / \Delta \alpha_1$  may be termed the sliding reduction and denoted by  $u_g$ . From Fig. 3, where the length of  $AP$  is denoted by  $a$ , we see that

$$PG = u_g = a + r_3 u.$$

This reduction  $u_g$ , as will appear shortly, is essential for determining the accelerating reduction. Since  $u_g$  appears in the diagram separately, it must signify a lever arm.

It will prove advantageous to consider that part of the mechanism, consisting of crank  $r_1$  and connecting rod  $r_3$ , separately from the part consisting of lever arm  $r_2$ . Fig. 3 shows the first part only, with the same designations as Fig. 3. In this

figure the perpendicular to  $A'B''$ ,  $O_1Q$ , represents the value which  $r_3 u$  has reached after the small advancement. Hence, if  $O_1Q$  intersects  $AB$  at  $J$ , then  $QJ$  is the increase or  $r_3 u$  or  $\Delta r_2 u$ . Here, however,  $\Delta r_2 u$  cannot be taken to equal  $r_3 \Delta u$ , since  $r_3$  itself is a variable. To simplify the mathematical expressions, due to the two variables in the increment  $\Delta r_2 u$ , let us denote  $r_3 u$  by  $i$ . Then

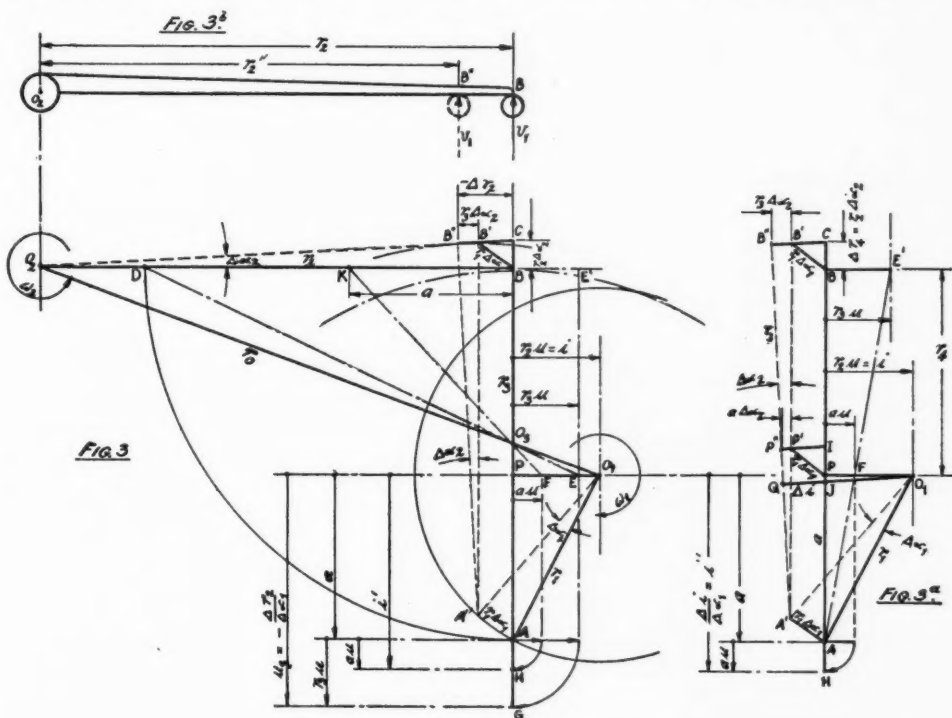
$$QJ = \Delta r_2 u = \Delta i$$

In order to establish a relation between this increment and the increments already known, we follow the motion of  $P$ , considered as a physical point of the connecting rod  $AB$  during a short advance. The parallel motion from  $AB$  to  $A'B'$  brings  $P$  to  $P'$ , with  $PP'$  equal and parallel to  $AA'$ , equaling  $r_1 \Delta \alpha_1$ . The angular motion  $\Delta \alpha_2$  brings  $P'$  to  $P''$ ,  $P'P''$  being equal to  $a \Delta \alpha_2$  and parallel to  $B'B''$ . Extending  $P''P'$  to its intersection with  $AB$ , at  $I$ , we see that triangle  $IPP'$  is congruent

$BB'$  and  $AP \perp B'C$ . Furthermore, side  $BB' (= r_1 \Delta \alpha_1)$  multiplied by the scale  $1/\Delta \epsilon_1$ , gives the length  $r_1$ , which is the length of the corresponding side  $O_1A$ . Thus the triangle part of the miniature figure is represented to a scale  $1/\Delta \alpha_1$  by triangle  $O_1PA$ . Hence  $PO_1 = r_3 (\Delta \alpha_2 / \Delta \alpha_1)$ . Our mechanism is of the first type in our classification, converting a driving rotary motion into a driven rotary or swinging motion. Therefore, according to equation (1) the speed reduction  $u = \Delta \alpha_2 / \Delta \alpha_1$ . Hence

$$PO_1 = r_3 (\Delta \alpha_2 / \Delta \alpha_1) = r_3 u.$$

Since  $u$  appears in our diagram as a coefficient of the length  $r_3$  it must be a ratio. However, for any position of the diagram, we could find the value of  $u$  by drawing a perpendicular from the center of rotation to the connecting rod and dividing the length of this perpendicular by the length of the driven lever arm for that particular position.



to triangle  $CBB'$  and that, for a sufficiently small advancement,  $IP''$  equals  $JQ$ , equaling  $\Delta i$ . Consequently we will add to the side  $PA$  of the magnified triangle  $O_1PA$ , an extension  $AH$ , corresponding to the extension  $P'P''$  of the miniature triangle  $PIP'$ . Then

$$AH = P'P'' \times \frac{1}{\Delta a_1} = a \frac{\Delta r_2}{\Delta a_1} = au.$$

We may determine this length from that of  $PE$  (Fig. 3) which, as we know, equals  $r_2u$ . Constructing, in Fig. 3<sup>a</sup>, the right angled triangle  $ABE'$  with  $BE' = PE = r_2u$ , we find through the intersection of  $AE'$  and  $O_1P$ , at  $F$ , in the length  $PF$  the value  $au$ . The same point  $F$  may be found, as in Fig. 3, by entering  $a$  in the upper parallel from  $B$  to  $K$ . Ray  $KO_1$  produces by its intersection with the lower parallel,  $F$ , in  $PF$  a reflection of  $a$  of the length  $au$ . By making  $AH$  equal to  $PF$ , equal to  $au$ , we have in  $AH$  the triangle extension corresponding to  $P'P''$ . We found that  $IP'' = \Delta i = \Delta r_2u$ . Consequently,

$$PH = \Delta i / \Delta a_1 = \Delta r_2u / \Delta a_1.$$

This derivative, according to mathematical usage, we will denote by  $i'$ . From Fig. 3<sup>a</sup> it is evident that  $i' = a + au$ . The value  $i$  may be termed the implicit accelerating reduction. Appearing in our diagram by itself, it must have the significance of a lever arm.

We now have the values of

$$u = \Delta a_2 / \Delta a_1, u_g = -\Delta r_2 / \Delta a_1 \text{ and } i = \Delta r_2u / a_1$$

for any given position of the mechanism, either directly or combined with a known factor. From these three values we can find the accelerating reduction  $u' = \Delta u / \Delta a_1$  by carrying out the differentiation of the implicit accelerating reduction  $i' = \Delta r_2u / \Delta a_1$ . We have

$$\frac{\Delta r_2u}{\Delta a_1} = u \frac{\Delta r_2}{\Delta a_1} + r_2 \frac{\Delta u}{\Delta a_1}$$

$$\text{or } i' = -u u_g + r_2 u'$$

$$r_2 u' = i' + u u_g.$$

From this equation we could find  $u'$ , since the varying length of  $r_2$  is known for every position. However, there is a slight uncertainty concerning the + and - signs of the three items that make up the expression  $r_2u'$ .

While this development of  $r_2u'$  is short and correct, it does not give a clear insight into the causal connection between the different items.

We wish to develop the expression for  $r_2u'$  in a way that really shows the mechanical connection between these three members and incidentally clears up the question as to the direction. By carrying out this development, we also wish to indicate the way to proceed, if one mechanism is actuated by another one, as, for instance, in the case of an articulated connecting rod.

Let us consider the whole mechanism as a combination of two separate mechanisms, the part shown in Fig. 3<sup>a</sup> driving the lever  $r_2$ . In Fig. 3<sup>a</sup> if we denote  $BP$  by  $r_1$ , then  $BC$  equals  $\Delta r_1$  and represents the travel of the connecting rod in its own direction during a short advancement. We keep in mind that  $\Delta r_1$ , as found before, equals  $r_2 \Delta a_2$ .  $PO_1$  now is equal to  $\Delta r_1 / \Delta a_1$ . That means that  $i$  ( $= \Delta r_1 / \Delta a_1$ ) is the speed reduction of the mechanism of Fig. 3<sup>a</sup> and has the significance of a lever arm. Similarly  $PH$  ( $= i' = \Delta i / \Delta a_1$ ) now denotes the accelerating reduction of the mechanism of Fig. 3<sup>a</sup>. It also represents a lever

arm. The values of  $i$  and  $i'$  undoubtedly are positive for the position shown.

The mechanism of Fig. 3<sup>a</sup> now drives the lever  $r_2$  with a linear speed  $v_1 = \omega_1 i$  and a linear acceleration  $v_1' = \omega_1^2 i'$ .

We now apply to this lever the rules found for a mechanism converting a driving motion into a driven motion. The fact that our mechanism consists of one element only, does not invalidate these rules.

We have, then, a mechanism converting a linear driving speed  $v_1$  and linear driving acceleration  $v_1'$  into the rotary driven speed  $\omega_2$  and rotary driven acceleration  $\omega_2'$ . The length of lever  $r_2$  is constantly changing, and on account of this change of leverage, the rotary speed of the lever would be accelerated even if  $v_1$  were constant and  $v_1' = 0$ . The movement of the lever in this case may be visualized, with reference to Fig. 3<sup>b</sup>, in the following way: A small ball at  $B$  contacts with one side of a material lever, the surface of this engaging side, if extended, passing through the pivot center  $O_2$ . Now let this globule run with uniform speed in a stationary spiral groove, point  $O_2$  forming the axis of the spiral and the spiral intersecting the engaging (central) lever line in any position at a constant angle (logarithmic spiral). Then the globule in contact with the lever has a uniform speed component perpendicular to the central lever line. This speed component we denote by  $v_1$ . It is evident that the globule in approaching  $O_2$  will accelerate the lever; for a tangential speed of  $v_1$  at  $B''$  means a greater angular speed of the lever than the same tangential speed  $v_1$  at  $B$ . If in addition to the above, the globule also has an accelerated movement, yielding a perpendicular accelerating component  $v_1'$ , it will impart to the lever an extra acceleration on that account.

Lever  $r_2$  being a mechanism of Type 4 in our classification, we repeat here the four equations of this group. In doing this, however, we shall employ the symbol  $\Delta$  for  $d$  and, where necessary for a distinction from previous expressions, use capital letters:

$$\text{Speed reduction } U = \frac{\Delta S_1}{\Delta a_2} \dots \dots \dots (1^d)$$

$$\text{Driven rotary speed } \omega_2 = \frac{v_1}{U} \dots \dots \dots (2^d)$$

$$\text{Accelerating reduction } U' = \frac{\Delta U}{\Delta S_1} \dots \dots \dots (3^d)$$

$$\text{Driven rotary acceleration } \omega_2' = v_1' \frac{1}{U} - \left( \frac{v_1}{U} \right)^2 U' \quad (4^d)$$

In equation (1<sup>d</sup>),  $\Delta S_1$  represents the driving travel during a short advancement, producing the driven angular travel  $\Delta a_2$ . Hence for lever  $r_2$  in Fig. 3,  $\Delta S_1 =$  the increment  $BC = r_2 \Delta a_2$ . Hence

$$U = \frac{\Delta S_1}{\Delta a_2} = \frac{r_2 \Delta a_2}{\Delta a_2} = r_2$$

$$\text{and } U' = \frac{\Delta U}{\Delta S_1} = \frac{\Delta r_2}{r_2 \Delta a_2}$$

Substituting

$$\Delta a_2 = u \Delta a_1$$

we get

$$U' = \frac{\Delta r_2}{\Delta a_1 r_2 u}$$

We had denoted the derivative  $-\Delta r_2 / \Delta a_1$  by  $u_g$ , considering  $u_g$  positive for a decrease of  $r_2$ . Then

$$\frac{\Delta r_2}{\Delta a_1} = -u_g$$

(Continued on page 417)



# Just Among Ourselves

## Change in Executive Attitude Toward Labor

TO one who has watched the development of executive psychology as regards labor and industrial relations problems over a period of some 10 or 15 years, the basic change in thinking which has come about is little short of remarkable. The surface changes have been numerous and much talked of, but the really important thing, it seems to us, is the way in which the social viewpoint has replaced the "this-is-my-business-and-I'll-run-it-as-I-please" viewpoint which still was not uncommon 10 years ago. The type of objective thinking on labor relations which is usual rather than unusual today among automotive executives has come about partly through a growing social consciousness on the part of the industry and partly because experience has taught that this viewpoint is good business in the long run.

\* \* \*

## Feeling of Responsibility for Welfare of Workers

THE extent to which the social point of view has permeated executive thinking in the automotive field is well illustrated by a few entirely casual remarks made in conversation the other day by the president of a big passenger car company. Discussing the current difficulties which the industry is experimenting in getting enough body workers of certain types, he remarked that "We don't want to advertise for men, because it would bring to Detroit a lot of labor from outside that we would have to take care of over the winter even though we know we won't need it at that time." The remark was quite casual, and for that

very reason it is interesting to note that, in this executive's thinking at least, it was simply accepted as a matter of course that, if men were encouraged to come to his plant to work this month, he assumed a certain amount of responsibility for their continued employment three months from now. In such casual ways, it is quite likely, we get a clearer picture of the soundness of the developments in automotive executive thinking on labor problems than in mere official and necessarily guarded pronouncements.

\* \* \*

## "Find the Nameplate," New Game for Public

BEAUTIES and belles of the fashionable world of old, we are told, sometimes spent hours adjusting and readjusting the position of that little black bit of sticking plaster known as the "beauty spot." For each peculiar type of beauty, for each new gown for each occasion the beauty spot had a particular *position propre*. The passenger car nameplate today seems to be undergoing something of the same cycle. After many years of peaceful resting at top center of the radiator shell, this characteristic emblem has started traveling on the 1929 models. On the new Chryslers it has vanished entirely from the radiator and is to be found in miniature atop the headlamps, although on the De Soto it peers out from the usual position at the top and in the middle of the radiator shell. Buick, on the other hand, has moved the nameplate emblem down to the middle of the radiator core, while Packard, which in recent years carried no nameplate on its radiator, now has placed one in the con-

ventional place. Not a bad idea, this, for the industry to get the blase public into the interesting game of "Find the Nameplate."

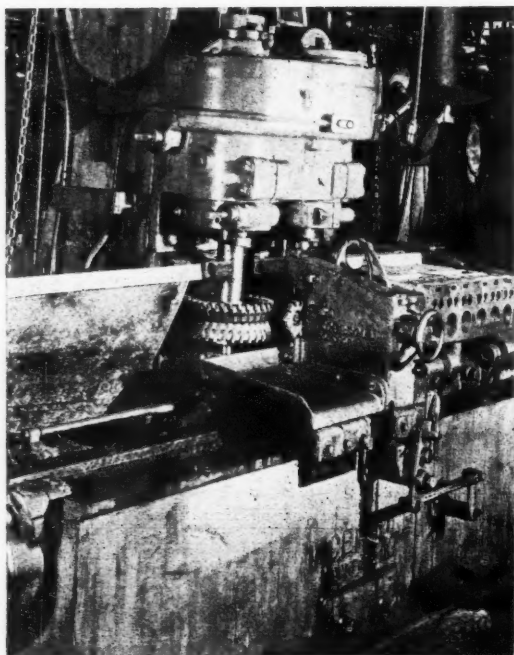
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## How Many Body Models are Too Many?

ONE of the problems bothering some of the more theoretically-minded men around the automobile plant is, "How many different body models are too many?" Everybody grants that there has to be a limit somewhere; factory men can be found without too vigorous searching who believe that their own companies have passed the limit already. But the fact that models are too numerous in any given case isn't subject to ready proof. It is easy to show in many instances that a relatively small number of body models account for a very large proportion of the total sales of a given line. In one middle-priced car line, for example, the roadster, four-door sedan and the coupe account for 75 per cent of the total output despite the fact that the total line comprises nine or 10 different types. If, in a case like this, the other six or seven types were dropped, would the company lose 25 per cent of its sales volume? Probably not; yet it is difficult to prove or to predetermine just how much of that 25 per cent would be retained with a less widespread range of cars. That merchandising as well as production costs increase directly with the number of models is pretty generally admitted, but the point at which these increased costs fail to be offset by increased profit rarely is known with any high degree of accuracy. A nice, problem, we call it.—N.G.S.



# Reo Cylinder Block Machining



Above—The first machine operation is to mill the bottom and both ends in an Ingersoll milling machine

Interesting series of operations carried out at company's Lansing plant. Casting, sprayed with gray lacquer before passing to machine line. Bottom is milled first for locating surface.

By K. W. Stillman

Right—The cam, crank and water pump holes are drilled simultaneously in a Barnes three-spindle, horizontal boring machine



**A**N interesting series of operations is carried out by the Reo Motor Car Co. in the machining of cylinder blocks.

Cylinder block castings arriving at the company's Lansing factory are filed and cleaned, the locating point provided by the foundry is ground, and the outside is spray-painted with gray lacquer.

The first machine operation occurs in an Ingersoll milling machine in which the casting is located from the foundry locating point and the bottom and both ends of the block are milled. With the milled bottom serving as a locating surface, the casting passes to a second Ingersoll miller where the top surface and the pump boss are milled.

From there it passes to a Leland-Gifford drill press where the two locating holes in the bottom surface are drilled and reamed. The diameters of these holes are held to plus or minus 0.0005-in. tolerance to insure accurate location for the many operations to follow.

The cylinders are then rough-bored in a Moline miller machine, the oil supply holes drilled in a Barnes drill and the bearing locks rough-milled in a Sundstrand "Rigidmil."

The cam, crank and water pump holes are next

bored in a single operation in a Barnes three-spindle drill, after which the manifold surface, the water jacket and the angle pad for the breather are milled in a Cincinnati miller and the hand hole cover pad is milled in a special Newton profile mill.

The crank bearings are milled to length in a Moline miller and the bottom surface and the bearing locks are finish-milled in Cincinnati and Ingersoll milling machines.

Two more cuts are made in the cylinder bores by means of a Moline boring machine and the generator pad is rough and finish-milled in a Newton miller.

## Drilling and Tapping

A series of drilling and tapping operations follow in Greenlee drills and tappers. Using three multiple-spindle drills—one for each of three surfaces—136 holes are drilled in the block and 32 of them are then tapped in a single Greenlee tapper.

The valve holes are rough-bored and finish-reamed to plus or minus 0.0005-in. tolerance in a Moline 12-spindle drill, followed, in another Moline drill, by drilling seven holes from the main bearings to the main oil holes.

The cylinder barrels are countersunk in still another

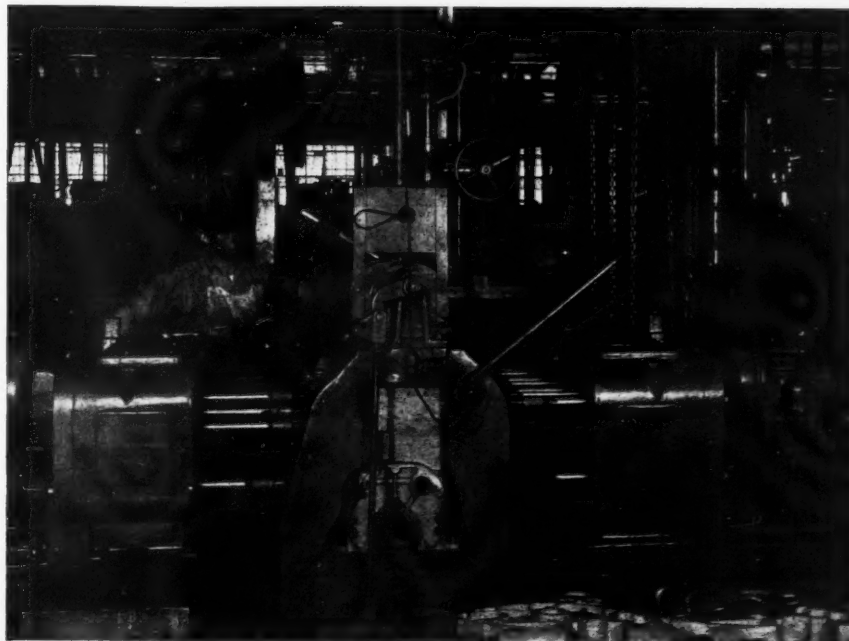
# Methods

Moline drill and the bearing stud holes are then countersunk and tapped by means of a Hammond radial drill.

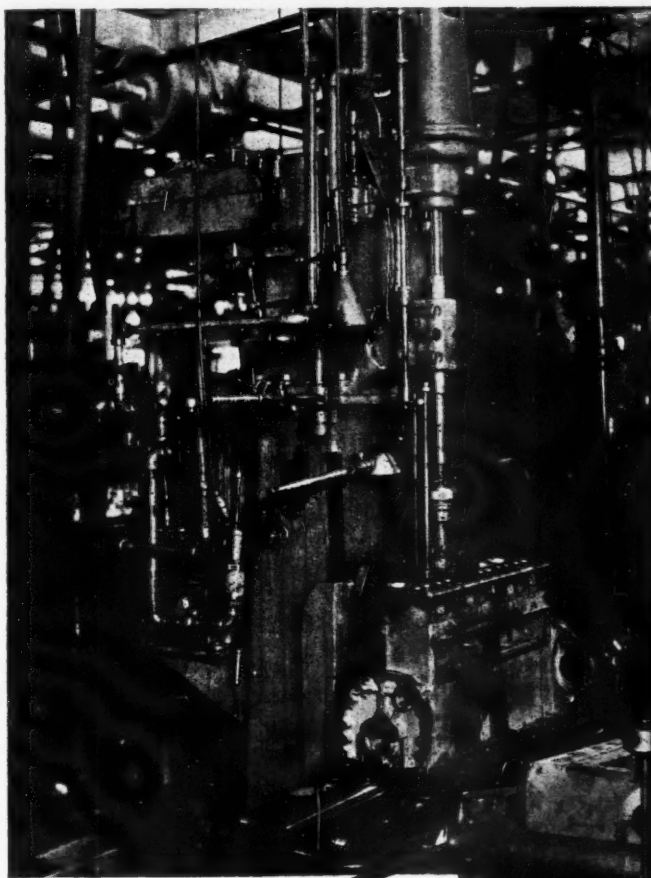
The cylinder block goes to a bench where the crank bearing cap studs are set in place and the bearing caps assembled, after which the crank hole is rough-bored in a Barnes boring machine.

Finish-boring of the crankshaft, camshaft and water pump shaft holes is completed next in a Barnes three-spindle boring machine. Tolerance for the camshaft hole is 0.0001 in., while for the crankshaft bearing it is plus 0.0000, minus 0.0005 in.

The ends of the rear crank bearing are finish-faced in a Cincinnati milling machine and the bosses for



*A two-way multiple spindle drill is employed to drill holes in two sides of the block*

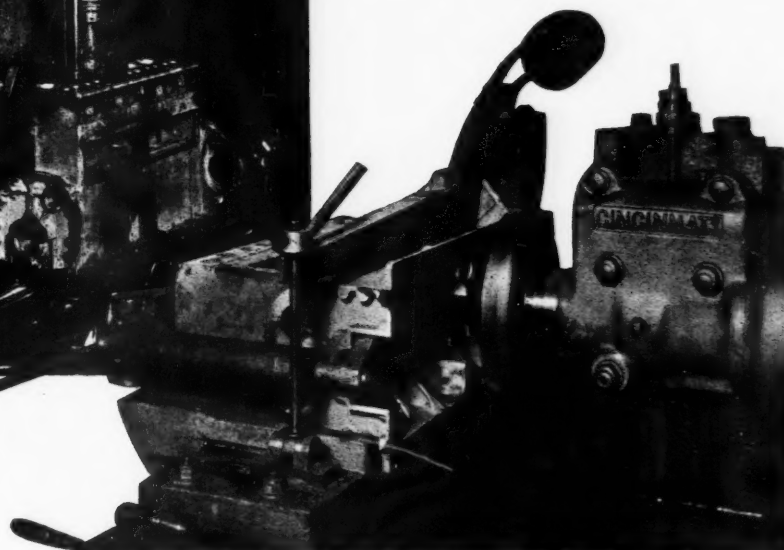


*Above—Cylinder bores are finished in a Barnes single-spindle boring mill, the tool of which is fitted with honing sticks*

and tapping operations follow to drill counterbore and tap four valve lifter guide holes; counterbore the rear cam bearing hole; drill holes to the main oil line; drill two holes to the rear cam bearing, and spot-face for the front oil line.

The oil pump housing hole is then bored and reamed in a Snyder drill, after which another Barnes drill is employed to drill two more holes, tap one and spot-face another. A Hammond radial drill is again brought into action to countersink and tap twenty-two 1/2-in. holes and tap thirty-two 5/16-in. holes.

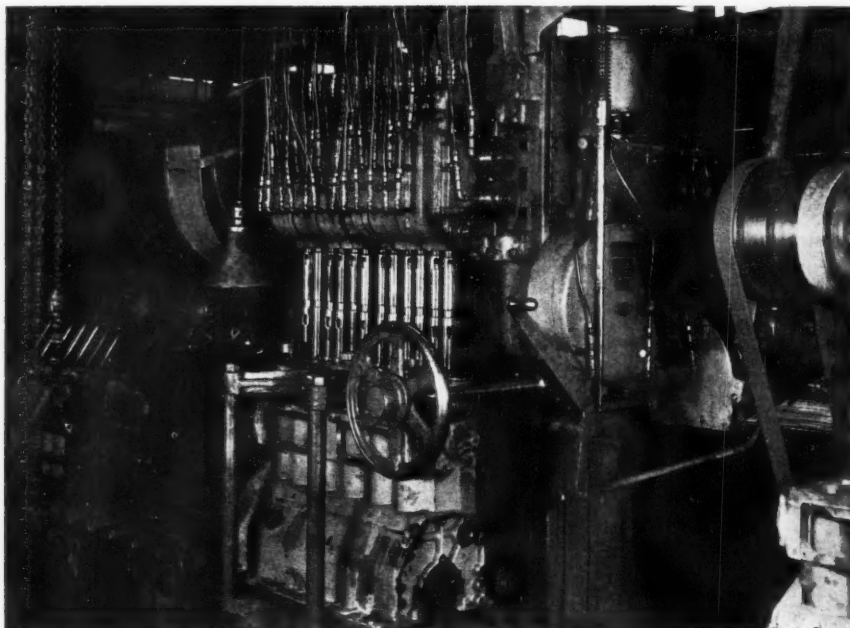
*Below—The bottom surface and bearing locks are finish milled in Cincinnati milling machines*



the valve lifter guides are drilled and the valve stem guide bosses are spot-faced in a Moline drill.

In two L.-G. special drills a number of drilling

Still another Hammond machine taps eight 3/8-in. holes; twenty-five 1/4-in.; two 5/16-in. and one 1/8 in. hole; pipe-drill and tap two 11/32-in. holes; tap two 1/4 in.,



Valve holes are rough bored and finish reamed in this Moline 12-spindle drill

and pipe-drill one 7/16-in. hole to the main oil line.

The hole for the oil gage is next drilled, reamed and spot-faced and the valve guide holes, the oil retainer holes and the rear main bearing are size reamed.

An L-G. drill is employed next to finish-ream and countersink the cylinder bores within tolerances of 0.001 in., after which they are honed in a Barnes machine equipped with honing sticks. The top surface is finish-milled, the valve guides assembled and the block passed to final inspection.

## Studebaker 1-Ton Truck

STUDEBAKER'S latest addition to its commercial car line is a 1-ton, 140-in. wheelbase delivery truck offered with panel and screen type bodies and priced at \$1,450. This new unit is powered by a six-cylinder Dictator engine and equipped with mechanical internal four-wheel brakes.

The engine, 3 $\frac{3}{8}$  in. bore and 4 $\frac{1}{2}$  in. stroke, is mounted in unit with a single plate dry clutch and a three-speed transmission. The fuel system consists of fuel pump which supplies gasoline to a 1 $\frac{1}{4}$  in. carburetor through a filter from an 18-gal. tank located at the rear. A hydrostatic gasoline gage is provided on the dash as well as a control for a manifold heated hot spot. Current for ignition is supplied by a Delco-Remy system and battery. Full pressure system of lubrication is employed, oil being supplied to the main, connecting rod and camshaft bearings from a gear pump with screen filter.

The cooling system consists of a centrifugal pump, tubular radiator, 16 $\frac{1}{2}$  in. four-blade fan and a thermostatic control unit in the cylinder head. Capacity is 3 $\frac{1}{2}$  gallons.

Power is carried back to a semi-

floating rear axle through 2-in. tubular shafts supported by three metal universal joints. Drive is taken through the springs, which are semi-elliptic; front 38 $\frac{1}{2}$  x 2 in., 13 leaves; rear 40 $\frac{5}{8}$  x 2 $\frac{1}{2}$  in., 12 leaves. The front drums of the four-wheel internal braking system are 12 x 1 $\frac{3}{4}$  in., the rear, 15 x 2 $\frac{1}{4}$  in. A drum at the rear of the transmission serves as a parking brake. The steering mechanism is of the cam and lever type.

The frame is of heavy pressed steel channel 6 1/16 in. deep, 3 in. flange and 5/32 in. stock. It is braced by seven cross-members, three pressed steel and four tubular. Wood wheels are standard as well as 30 x 5 in. high pressure tires.

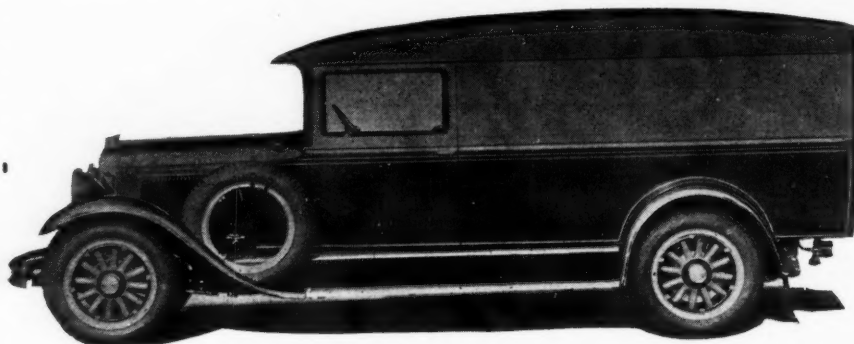
Standard equipment includes automatic windshield cleaner, rear mirror, speedometer, head, tail and dome-lights, spare rim carrier and coincidental steering and ignition lock.

The body frame is built of hardwood with all joints glued and screwed. Height of the roof line has been reduced without effecting capacity by use of a special sub-frame with cut-away sills. Wheel housings are built-in and laminated. Dimensions of the panel body follow: Overall length, 146 $\frac{1}{2}$  in.; width, 57 $\frac{1}{4}$  in.; height, 58 $\frac{3}{4}$  in.; length of floor, 101 $\frac{1}{2}$  in.; width of floor, 43 $\frac{3}{4}$  in.; height under roof bow, 53 in.; height of rear door opening, 44 $\frac{1}{2}$  in.; width of rear opening, 47 in.; ground to floor, 27 in.; and width of front door, 35 in.

THE Meriam Co., Cleveland, Ohio, has placed on the market a new type of indicating flow meter suitable for measuring the flow of air, gas, saturated or superheated steam, oils and other liquids at any temperature, vacuum or pressure.

The new meter has been designed primarily for high pressures—1000 lb. per sq. in. or greater—but it can be adapted readily for low pressures or vacuum. Its operating principle depends upon the loss of pressure caused by flow through a pipe. An orifice disk is placed in the path of flow and two small tubes are connected to the pipe line, one on each side of the orifice disk. The difference in pressure between the two sides is recorded by the level of mercury or other non-evaporating liquid.

All joints, valves, etc., in the meter have been welded by the atomic hydrogen method to insure tightness.



New Studebaker 1-ton delivery truck



# Luster of Lacquer Finish Depends on Dispersion of Pigments

Thorough dispersion reduces time required for polishing to high gloss. Development of present lacquers is due to ability to produce low-viscosity cellulose nitrates.

**A**N interesting review of the history of the development of pyroxylin lacquers and particularly of Duco lacquer was given in a paper by M. J. Callahan recently before the Society of Chemical Industry at the Chemists' Club in New York. Following are some abstracts from Mr. Callahan's paper that should interest automobile engineers and automotive production men:

The basis for Duco type lacquers is cellulose nitrate of the so-called solution type. The historical development of cellulose nitrate can be used, therefore, as a background for the development of lacquer. Described first by Schonbein, an Austrian, in 1845, early efforts were largely devoted to the application of the product for military purposes. A large amount of necessary knowledge regarding conditions of nitration and stabilization was developed, and it may fairly be said that this laid the groundwork for the later adaptation in the fields of celluloid, photography and solutions. Since it is with solutions that the development under discussion is concerned further references will be confined to this field.

It was early noticed that certain types of cellulose nitrate having a nitrogen content in the range below 12.5 per cent were readily soluble in organic solvents such as acetone, ethyl acetate, or mixtures of ethyl ether and ethyl alcohol, and that when such solutions were poured upon smooth surfaces a continuous film resulted. In the fifties Scott Archer made use of this property in wet-plate photography, and Alexander Parkes called attention to the possibility of using it for obtaining protective coatings for wooden and metallic objects. No important industrial developments resulted immediately, however, due to the fact that films made from the solvents mentioned shrink badly on drying, tending to wrinkle and turn white. With the discovery of the value of amyl acetate in preventing these effects, real progress in solution development began.

In 1882 J. H. Stevens obtained a series of patents in one of which amyl acetate was mentioned as a solvent for cellulose nitrate. With the advent of this solvent into the art many of the difficulties which had prevented rapid development of the use of solutions for coatings

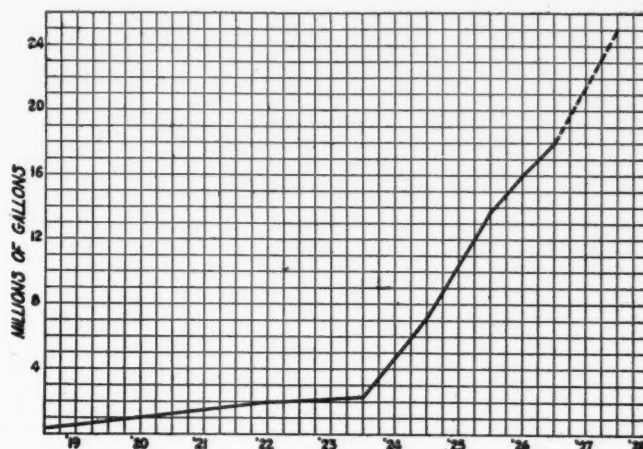


Fig. 1—U. S. production of pyroxylin lacquers and enamels, 1919-1927

were eliminated and the foundation for the present industry was laid. During the next 30 years a steady growth ensued. The number of experimenters in the field increased. Knowledge of the solubility factors of different types of cellulose nitrate was broadened, new solvents were found, and their methods of manufacture cheapened; methods of combining cellulose nitrate with various resins, vegetable oils, etc., were worked out. During this period also the uses of cellulose nitrate solutions were extended to the photographic industry, the leather industry, and the artificial silk industry. To a large extent, however, the chief field of application of solutions lay in their use as protective coatings in the form of lacquers, bronzing liquids, or enamels. In this field properly compounded cellulose nitrate solutions made a special appeal because of their quick-drying quality, transparency and brilliance of film and their quality of giving protection in very thin films.

The first two decades of the present century were marked by a continuation of this slow but steady growth in the general use of lacquers, but at no time up to the period marked by the ending of the world war were there any indications that the lacquer industry was to become the influential factor in the field of protective coatings that in a space of five years has worked a complete revolution in methods and ideas of finishing.

## Development Began After War

With the ending of the world war, however, at least four factors, one economic and three of chemical significance, began to operate, and a situation was thus created particularly suited to the development of a product such as Duco. The economic factor was the expansion of the automobile industry.

In the painting of automobile bodies, protective coatings based on oleoresinous paints were used. Not only was the operation of producing the finish inefficient and costly, but the result obtained was entirely unsatisfactory from the standpoint of the consumer purchasing the machine. In the latitude of New York City the average durability in 1920 of a finish on an automobile of the medium-price class (about \$2,000) was one summer.

Simultaneously with the development of this economic and manufacturing situation, three factors of interest to the lacquer chemist and of equal importance had evolved. The importance of amyl acetate as a constituent of the solvent portion of lacquers to obtain smooth films and to prevent whitening or "blushing" had stimulated research in the solvent field, and over a term of years a large number of solvents had been investigated and studied.

#### Application of Butyl Alcohol

A case in point and the first factor in the developing situation was the application of butyl alcohol to the lacquer industry. Normal butyl alcohol had accumulated in large quantities as a by-product in the manufacture of acetone by fermentation of corn. Normal butyl acetate was adaptable as a constituent of lacquers in the same manner as amyl acetate. There were thus available large supplies and an assured source of supply of a necessary solvent in lacquer manufacture. The du Pont company had begun the use of butyl alcohol and acetate in lacquers a considerable period before the establishment of the butyl industry in the United States, supplies of the alcohol being imported from England, where the fermentation process for production of acetone was then in use.

A second factor of chemical importance was the after-war presence of tremendous quantities of cellulose nitrate in the form of smokeless cannon powder. In such form it was of no economic value to the country at large, and its storage and maintenance provided a hazard and a constant burden of expense to the Government. This was a challenge to the chemist, which was accepted, and after several years of research, methods of recovering and utilizing the cellulose nitrate of smokeless cannon powder were worked out, further assuring the lacquer industry of available and cheap sources of supply of a basic raw material.

A third factor of still greater importance was the development of knowledge that pigmented cellulose nitrate solutions could be applied to automobile bodies and a finish of vastly improved resistance to weathering obtained. Cellulose nitrate enamels were first applied to automobile bodies in refinishing work about 1916. The earliest development occurred in California, where a number of automobile refinishing shops made use of these enamels applied directly over the old varnish finish, or over air-dried oil-type primers and fillers. Though the results obtained were not entirely satisfactory from an automotive production standpoint, the striking and impressive durability of the finish under the severe climatic conditions of the Pacific Coast pointed significantly toward the application of cellulose nitrate lacquers in the field of automobile body finishing.

#### Much Research Work Necessary

While all the factors enumerated conspired to hasten the adoption of lacquers for this purpose, it was still necessary to do considerable chemical research work in order to complete the development of Duco-type lacquer. Up to 1919 all lacquer products were based on cellulose nitrate, which in solution gave a relatively high viscosity. For this reason a single application of solution resulted in the deposition of very thin films. In order to obtain films of satisfactory durability, the application of 16 or more coats was necessary. Obviously, it was necessary to produce lacquers with a higher content of cellulose nitrate. This was accomplished through the discovery of methods of reducing the viscosity of the cellulose nitrate while still retaining film strength and durability, and applying them to manufacture.

A number of methods of producing low-viscosity cellulose nitrate have been mentioned in the chemical literature. Essentially they depend on the action of heat alone, heat in the presence of reagents at controlled alkalinity, or the action of ultra-violet light. In the modern lacquer industry the first two methods only have found commercial application.

Heating of cellulose nitrate in solution as described by Carlsson and Thall, though capable of producing reduced viscosity products, has obvious disadvantages of difficult operating procedure, accompanied by large losses of expensive solvents, and allows no provision for the removal of by-products in the form of nitric and nitrous acids, which result in small amounts from the reduction in viscosity. It has become general practice in the industry, therefore, to apply heat to the nitrate in the fibrous condition using as a starting material properly stabilized cellulose nitrate, such as has been in use in the explosives industry for many years.

The second method of reducing viscosity through the use of slight alkalinity and lower temperatures has also found rather wide application, particularly in the recovery of cellulose nitrate from smokeless powder, its reduction in viscosity, and subsequent use in lacquers. In a United States patent granted to E. C. Pitman is described a method of applying this process which has been in commercial use for a number of years, and has been used to produce a large proportion of the cellulose nitrate used as a basis for Duco.

#### Clear Finishes First Used

Strangely enough, the discovery of methods of producing low-viscosity cellulose nitrate did not lead to immediate application of its pigmented solution for the painting of automobiles. The earlier applications were in the field of clear finishes for wooden objects and furniture. In these fields the quick-drying character of the finishes made a special appeal.

Mention has already been made of the use of cellulose nitrate of high viscosity for refinishing automobiles in California. Application of the low-viscosity type lacquers was immediately begun, and for the three years preceding 1923 the lacquer industry devoted the larger part of all technical efforts to the solution of this problem.

In this development the co-operative efforts of the technical staffs of the General Motors Co. and du Pont Co. were largely responsible for the success achieved. In 1920 the General Motors Research Laboratory undertook a study of various types of automobile finishes with the object of developing an improved system. This work was sponsored by Dr. Kettering and Dr. Clements, and carried out very ably by H. C. Mougey. Early in the development the technical staff of the Cellulose Products Division of the du Pont Co. began to contribute products based on cellulose nitrate, and the coordinated efforts of the two staffs led to the final product, Duco, used at the present time as an automobile body colored finish over the entire world.

The modern lacquer is much more than a solution of cellulose nitrate in organic solvents. Besides the nitrate, natural resins, vegetable oils, plasticisers, stabilizers, and pigments are normally included. Resins commonly employed are dammar and ester gum. Recently, certain synthetic resins of the Abertol and Glyptal types have found application. Vegetable oils commonly used are castor, linseed, and tung. Plasticisers are the phthalates, camphor and camphor oils, and tricresyl phosphate. Solvents are divided into several classes depending on their rates of evaporation, and aromatic hydrocarbons are commonly used for dilution and



thinning purposes. The proper selection and balancing of these ingredients is the determining factor in the application of the lacquer and the properties of the finished film.

Durability under conditions of outdoor exposure in particular depends largely on the ratios of ingredients in the film. Use of cellulose nitrate of too low viscosity will result in lack of film strength followed by cracking and peeling. Too low a ratio of pyroxylin to other clear film ingredients will produce a finish that will check. Lack of adhesion of a finish is a result of a high ratio of cellulose nitrate to other film ingredients.

The effect of pigments on durability is especially marked. A clear film of cellulose nitrate is extremely sensitive to the ultra-violet rays of the sun's spectrum, and a clear film exposed for only a few days becomes so brittle that it will not withstand mild bending without cracking. This is accompanied by a drop in viscosity of the cellulose nitrate. The use of oils and plasticisers will extend this life, but eventually failure will occur. However, if such a film be protected from the sun's rays by the use of opaque pigments, particularly when the film is applied to a rigid surface, such as steel, almost indefinite resistance to sunlight will result. The action of pigments appears to be specific. A pigment of the incorrect type will cause failure in a short space of time.

Solvents play an important part in affecting the working qualities of lacquers. The viscosity characteristic of the cellulose nitrate will largely determine the concentration of a lacquer at spraying viscosity, but this can also be affected by the choice of solvents. Materials such as ethyl acetate or acetone produce solutions of lower viscosity at the same concentration than their higher homologues.

A modern automobile lacquer can be applied with only three minutes' air drying between coats. After the last coat the drying is continued for one hour at room temperature or 15 min. at 120 deg. F. and the finish is then sanded and polished. "Orange peel" or spray wave is sanded out, and although this can be decreased by the use of large quantities of thinner, it has been found most economical to use the maximum of non-volatile possible and to "sand out the orange peel." The present tendency is toward higher solids lacquers than were in use in 1923, at the time of their adoption by the automotive factories.


#### Dispersion of Pigments

The requirement of a smooth finish of luster and beauty is closely related to the methods of manufacture of a lacquer. The dispersion of pigments in a lacquer is a large factor in determining its ease of polishing. The more perfect the dispersion the more rapid a high gloss from polishing will result and the higher and better the finished luster. This factor affects also the repair work in the finishing plant where spots marred by bump or rubbed too thin must be touched up.

Duco lacquer was first adopted for production use in the automotive industry in 1923. It was scarcely to be expected that the first lacquers used fulfilled in all respects the requirements outlined. However, it was a source of considerable surprise to the lacquer technologist to see to what an extent they were satisfactory. Both the automotive manufacturer and the public purchasing the cars, after the first hesitant trials, recognized the important advance in finishes that had been made, and progress became extremely rapid. The use of lacquer spread into a large number of industrial fields other than the automobile industry.

The economic results of the development of Duco type lacquers have been very broad and far reaching, and

represent an important contribution of industrial chemical research to general wealth. In 1919 there were less than ten manufacturing establishments engaged in the manufacture of cellulose nitrate solutions. The combined capitalization was probably less than \$10,000,000. At the present time there are over 200 concerns manufacturing lacquers in some type or form, and the combined capitalization is probably in the neighborhood of \$50,000,000. Some idea of the rapid growth of the use of lacquers is indicated by the curve shown in Fig. 1. This curve is based on statistics published by Bureau of Commerce. The very rapid increase of production over the years immediately following 1923 is notable as indicating the profound influence exercised by the development of Duco.



## Books for the Business Bookshelf

### *The Modern Gasoline Automobile*

Victor W. Page. The Norman W. Henley Publishing Co., New York. 1150 pp. illus. \$5.

THIS new edition of a well-known reference book has been brought up to date to include information concerning motor vehicles of the most recent design. Like previous editions, the book is profusely illustrated and is written in non-technical language so that it might serve as a textbook in schools or for the use of mechanics and others desirous of increasing their knowledge of motor vehicle design and operation.

### *Standards and Standardization*

Norman F. Harriman. McGraw-Hill Book Co., New York. 265 pp. \$3.

WITH all the activity during recent years looking toward progress in standardization, it is, perhaps, unfortunate that practically no material has been published in permanent form to explain and expound the principles underlying the art. Mr. Harriman, who is with the National Bureau of Standards, has had a splendid opportunity to observe what constitute the elements of successful standardization work and presents them ably in the present volume. All manufacturers should find something of interest and of value in this exposition of what standardization may accomplish and how it may best be brought about.

### *Principles of Transportation*

Emory R. Johnson, Grover C. Huebner and G. Lloyd Wilson. D. Appleton & Co., New York. 815 pp. \$5.

WHILE this book should be of interest to all persons interested in any phase of transportation, presenting, as it does, a comprehensive view of the whole field of rail, motor, water and air transport, it will be of particular interest to automotive men for the sections devoted to motor vehicle and aircraft. While considerable more space has been devoted to rail transport than to other forms this is in accord with the relative importance of the various transportation mediums and the authors are by no means prejudiced for or against any particular method. The relative advantages and disadvantages of all transport mediums, both as individual services and as a part in a coordinated whole, are presented fairly and fully. Of especial interest is the concise summation of the present status of regulation of motor transportation.



# Airship Declared Most Promising Mode of Overseas Travel

*Development has been neglected despite fact that engineering and construction problems have been solved. Government urged to lend aid until industry is established.*

By Carl B. Fritsche \*

Vice-President, Aircraft Development Corp.

RECENT trans-Atlantic flights have served to mask the inherent limits of commercial range of the airplane, with the result that the superior qualifications of the rigid airship for long-distance, heavy-cargo service have apparently been overlooked.

The commercial common factor of aircraft is best expressed in the weight of commercial load transported over a given range.

Eminent authorities agree that not only does the airplane fail to increase in efficiency with the size in this respect, but that in the extremely larger sizes the

the carrying capacity left available for pay cargo, the operation of large flying boats in non-stop service across the Atlantic Ocean is financially impracticable.

The rigid airship, in contrast to the airplane and flying boat, increases in efficiency with size. Three example are given in an accompanying table.

And these airships are not miracles. From an engineering standpoint there is absolutely no mystery about man's ability to build them successfully. The proved materials are available. The practical methods of bonding these materials together are well known. The skilled labor can be secured. In fact the two airships now being built in England are about equivalent to the first size illustrated, and the 250-ton ship follows in natural sequence.

The 250-ton rigid airship, whose performance is described above, would be equipped with an engine capacity of 6000 hp. and would transport 65 tons of pay cargo on a 3200-mile non-stop flight from New York to London.

It would require 13 flying boats of 50 tons gross weight each, and having a total rated hp. of 78,000, flying 4400 miles via Bermuda and the Azores (in order to refuel) to equal this performance.

For a comparison let us select a 6000 hp. airship with gross weight of 250 tons and capable of carrying a pay load of 65 tons or 65 passengers, the ship having a cruising speed of 75 m.p.h. at three-fourths power. Thirteen flying boats of 6000 hp. each and a gross weight of 50 tons each would be employed to equal the pay load performance of the one airship. The comparison is summarized in Table B.

## 158 Ships Built to Date

A survey reveals that 158 units represents the world's effort to date in rigid airship construction. Semi-rigids constructed in Italy, France and elsewhere are not included because their inherent limits in size and strength eliminate them from competition with the rigid ship in long-distance commercial application.

It is roughly estimated that these 158 rigid airships represent a construction cost, including fixed equipment, of not to exceed \$75,000,000. This, of course, is exclusive of shops, hangars, etc. It is boldly estimated that the world to date, including the enormous and necessarily wasteful war expenditures and the cost of post-war activities, has spent a total of \$3,500,000,000 for both military and commercial airplanes and fixed equipment. An examination of governmental budgets will justify this figure.

This explains in part why the development of lighter-than-air transport is the most neglected engineering

## New York to London Non-Stop Airship Service— 3200 Miles

	(Helium Inflated)		
Gross weight of airship..	150 tons	250 tons	500 tons
Useful load .....	78 tons	140 tons	295 tons
Useful load per hp. ....	39 lb.	47 lb.	59 lb.
Pay cargo .....	28 tons	65 tons	170 tons
Percentage of gross lift available for pay cargo	19 per cent	26 per cent	34 per cent

airplane actually shows a decrease in efficiency. Some authorities conservatively establish the maximum efficient size of the airplane at 50,000 lb. gross weight and its useful load at 11 lb. per hp.

Certain European engineers voice the opinion that the maximum efficient size of the flying boat exceeds that of the airplane, possibly by a ratio of 2 to 1. Probably this is due in part to the absence of the enormous parasite drag from multiple landing gear with wheels about 6 ft. in diameter which would be required on an airplane of 50,000 lb. gross weight. Furthermore, a higher landing speed can be tolerated in flying boats than in airplanes because boats in maneuvering are not restricted to the narrow confines of landing fields; they can utilize more distance and the impact at landing on water is more evenly distributed throughout the structure than is true of the airplane on land. This advantage is one which permits a high wing load factor for the large flying boat.

Inasmuch as it is axiomatic in transportation experience that any vehicle must be able to support itself in the medium in which it floats, the large flying boat obviously is preferable to the airplane in application to long distance overseas flying.

However, inasmuch as the utilization of an excessive proportion of useful load for fuel purposes decreases

\* Abstract of paper delivered before American Society of Mechanical Engineers (Aeronautical Division).

art in the realm of aeronautics today. It has not advanced as rapidly as heavier-than-air for the simple reason that approximately for every dollar spent on airships, at least \$50 have been spent on airplanes. As Charles Grey, editor of *Aeroplane*, London, has put it, "Airships breed like elephants while airplanes breed like rabbits."

Certainly the record of progress of the airship would be entirely different if an equal amount of money had been made available for its development.

This comparative examination inevitably leads to three conclusions:

1. In commercial application, the airplane, large or small, has comparatively a short range. Physically it is unsuited to overseas service. Its use in transoceanic flying is unsafe and should be discouraged.

2. Provided intermediate stops at suitable intervals are available for refueling, the large flying boat has possibilities in overseas service. However, no matter how large it may be built, it can never compete successfully with the rigid airship in economy, comfort and safety.

3. The large rigid airship will always be supreme in long-distance, heavy-cargo transport. It is the most neglected, yet the most promising mode of transportation overseas extant. It is the duty of the government to provide liberal appropriations for its improvement and advancement to the point of development where private capital is justified in undertaking the responsibility alone.

This last conclusion does not mean that private initiative should be discouraged from providing capital for engineering and manufacturing facilities. But it does mean that the government should provide the original market by adopting a continuing program for the construction of rigid airships commensurate with the program already adopted for airplanes and with the important position our country occupies in the family of nations.

TABLE B  
NEW YORK TO LONDON  
6000 Hp. Airship vs. 6000 Hp. Flying Boat

Unit Comparison	Airship	Flying Boat	Approx. Ratio
Tons, gross weight .....	250	50	5.0
Tons, useful load .....	140	25	5.6
Tons, pay load .....	65	5	13.0
Horsepower .....	6000	6000	..
Fuel reserve, per cent .....	50	25	2.0
Pounds useful load per hp. ....	47	9.47	5.0
Pounds pay load per hp. ....	21.67	1.67	13.0
*Construction Cost — Airship @ \$15,000 and boat @ \$7,500 per gross ton .....			
	\$3,750,000	\$375,000	10.0
Route Comparison			
Distance, miles .....	3200	4400	3/4
Time required (still air) hours..	43	43	..
Landings, including intermediate stops .....	1	3	1/3
Collective Comparison—For Same Pay Load			
Number units employed .....	1	13	1/13
Total gross weight, tons.....	250	650	5/13
Total pay load, tons .....	65	65	..
Total horsepower .....	6000	78,000	1/13
*Total construction cost .....	\$3,750,000	\$4,875,000	3/4
Total fuel required, tons .....	75	533	1/7
Total cost of fuel @ \$80 ton....	\$6,000	\$43,640	1/7

\* Construction cost based on production and not on experimental units which would run considerably higher.

## Geometrical Motion Analysis

(Continued from page 408)

Hence

$$U' = \frac{u_g}{r_2 u}$$

Substituting the values of  $U$  and  $U'$  in equation (4<sup>d</sup>) we have

$$\omega_2' = \frac{v_1'}{r_2} + \left(\frac{v_1}{r_2}\right)^2 \frac{u_g}{r_2 u}$$

The tangential linear speed  $v_1$  can now be expressed by the rotary speed  $\omega_2$  in the relation  $v_1 = \omega_2 r_2$ . Hence

$$\omega_2' = \frac{v_1'}{r_2} + \frac{\omega_2^2 u_g}{r_2 u}$$

Furthermore,

$$v_1' = \omega_1^2 i' \text{ and } \omega_2 = \omega_1 u.$$

Then

$$\omega_2' = \frac{\omega_1^2 i'}{r_2} + \frac{\omega_1^2 u^2 u_g}{r_2 u}$$

or

$$\omega_2' = \omega_1^2 \left( \frac{i' + u u_g}{r_2} \right)$$

The bracket expression, multiplied by the square of the driving speed, gives the driven acceleration. This, according to equation (IV), is the definition of the accelerating reduction  $u'$ . Hence:

$$\text{Accelerating reduction } u' = \frac{i' + u u_g}{r_2}$$

$$\text{and } r_2 u' = i' + u u_g.$$

Here  $u'$  appears as a factor together with the length  $r_2$ ; therefore it must be a proportion; also  $i'$  represents the contribution to the total acceleration of the linear acceleration of the separate mechanism of Fig. 3<sup>a</sup> and  $u u_g$  the share of the sliding action of a uniform tangential speed on the lever  $r_2$ . From this interpretation it is evident that, for a decrease of  $r_2$  ( $-\Delta r_2$ ),  $u_g$  must be positive.

(To be continued)

FOUR new standardization projects for mechanical equipment have been suggested to the American Engineering Standards Committee by the American Society of Mechanical Engineers. These projects, which are now being considered by the A.E.S.C., are:

Standardization of stock sizes, shapes and lengths for iron and steel bars including flats, squares, rounds and other shapes. The standardization of Woodruff keys, a project now under way under A.E.S.C. auspices, has emphasized the necessity of standardizing the sizes and shapes of iron and steel bars.

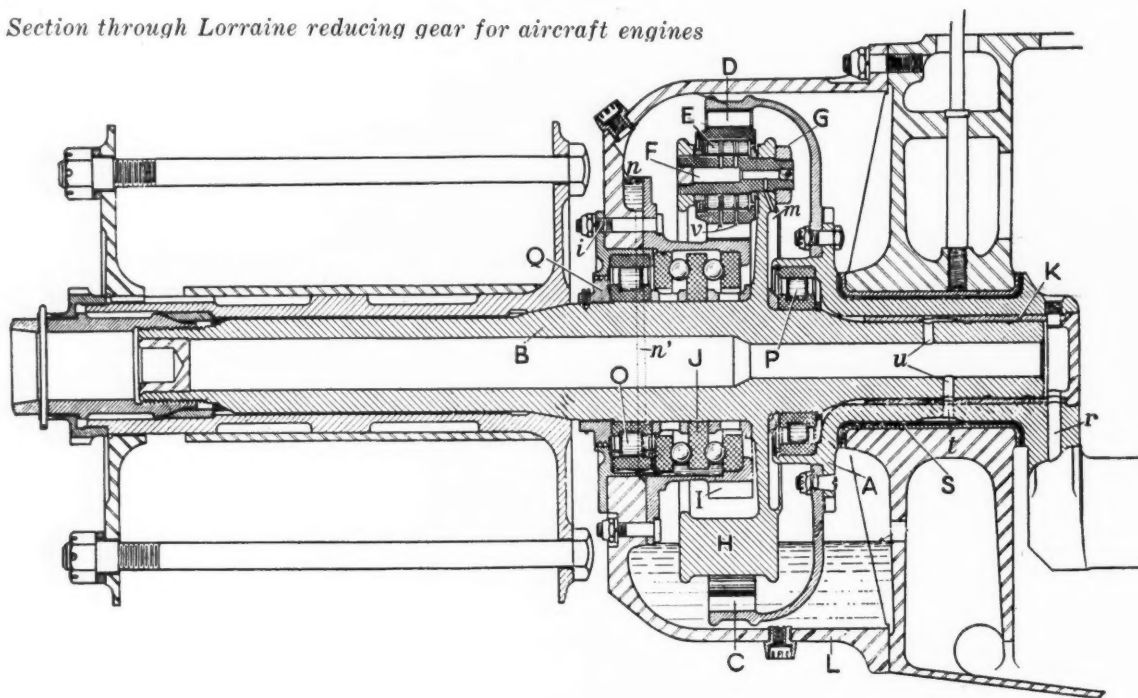
Standardization of splined shafts and splines. It is recommended that the scope of this subject include a study of the relations between keys and shafting of various kinds; square and flat keys, both parallel and taper; splines and double keys, etc.

Standardization of rolled threads for screw shells of electric sockets and lamp bases. The purpose of this project is the development of thread standards for the new "intermediate" size lamp socket and base.

Standardization of dimensions of stud bolts, including thread dimensions and working tolerances.



Section through Lorraine reducing gear for aircraft engines



## Lorraine Develops Own Reducing Gear for Aircraft Engines

With reduction ratio of 1.545:1, engine speed of 1900 r.p.m. corresponds to propeller speed of 1230 r.p.m. Device is of planetary type. Used by Armstrong-Siddeley.

A REDUCING gear of the planetary type for aircraft engines has been developed by the Société Lorraine of Argenteuil, France, and in addition to being used on the aircraft engines of that company is also fitted by the Armstrong-Siddeley Co. in England. The Société Lorraine does not use the Waseige-Farman reducing gear as stated in an article in *Automotive Industries* of July 28.

A sectional view of the Lorraine reducing gear is shown herewith. The propeller-carrying shaft is supported at the forward end by a roller bearing *O* and at the rear by another roller bearing *P* and a bronze bushing *K* fitted inside the crankshaft. The front journal of the crankshaft is supported in a babbitt-lined bearing. To an integral flange on the crankshaft is bolted the internal gear crown *C*. This gear crown, in rotating with the crankshaft, carries along the propeller, by meshing with the planetary pinions *D*, which rotate both around their own axes and around the stationary pinion *I*, which latter is secured to the housing by bolts *i*.

The propeller-carrying shaft, which carries the planetary pinions *D*, turns at a lower speed than the crankshaft, the reduction ratio being 1.545:1.

Lubrication of the reduction gear is effected by means of oil under pressure which enters the interior of the hollow propeller-carrying shaft through holes *T* and *U*. This oil also lubricates the front bearing *S* of the crankshaft and the inside bearing *K* through the same holes *T* and *U*. Passing through oil grooves cut in the bearing

bushing it floods the roller bearing *P*, whence it is thrown off into the collector channel *M* formed near the periphery of the pinion-carrier plate *H*. Centrifugal force compels the oil to enter the hollow pins *F* on which the planetaries revolve, through registering drill holes. From the interior of these pins it passes through radial holes to the rollers on which the planetaries revolve, and it escapes from the roller bearings through radial holes *V* drilled in the pinions. Thus there is a constant circulation of oil, which serves not only to lubricate but also to cool the pinions.

### Oil Collects in Pocket

The oil thrown off by the pinions gathers on the walls of the housing and some of it collects in a small pocket *N*, whence it flows through a passage *N* to the roller bearing *O* and the double thrust bearing *J* which takes the propeller thrust.

The lower part of the housing for the reducing gear is filled with oil to such a level that the internal gear crown is at all times partly submerged. Thus the meshing gears are constantly flooded with oil. An oil-guard *Q* at the side of the reducing gear toward the propeller prevents loss of oil from the case.

The reduction ratio of 1.545:1 was adopted with a view of limiting the speed of the engine to a value which would assure a satisfactory life of the engine and to keeping the propeller diameter down to a figure which would not be prohibitive on multi-engined airplanes and seaplanes. An engine speed of 1900 r.p.m.

corresponds to a propeller speed of 1230 r.p.m. The pinions and gears of the reducing gear all have straight teeth and are mounted on parallel axes. They have such dimensions that their accuracy may be readily checked by the usual inspection previous to assembly. The clearance between teeth is determined by the manufacturing process and no adjustment is necessary in order to insure proper distribution of loads. The tooth loads and bearing loads are quite moderate.

The low-speed shaft which forms the cage of the planetary gears is a very robust member, in a single piece, and therefore not subject to deformation. Studs for the planetary pinions are straddle-mounted. These studs are located at equal angular distances from each other and at equal distances from the axis of the shaft by mechanical means in such a manner that their angular spacing and their concentricity can be readily checked. The positioning of the pinion studs is not affected by wear, hence the studs and the pinions can be replaced at any time without need of highly specialized labor.

The wearing parts are constituted by roller bearings at which there is only an insignificant amount of wear. Replacement of these bearings is an easy matter and does not call for any adjusting operations, properly speaking. All parts are mounted concentric with respect to the crankshaft, which makes it possible to assure one's self of the proper operation of the assembly before placing it in service.

## Petroleum Hydrocarbons

AMONG papers presented at a meeting of the Petroleum Division of the American Chemical Society, in Swampscott, Mass., was one dealing with apparatus and methods for the determination of the constituent hydrocarbons in petroleum. The authors are Edward W. Washburn, Hohns H. Bruun, Mildred M. Hicks and Martin Shepherd, and their paper is entitled "Apparatus and Methods for the Separation, Identification and Determination of the Chemical Constituents of Petroleum." The apparatus referred to includes the following:

1. A new design of rectifying-column plate which combines the bubble cap and reflux drain.
2. A rectifying still with a 20-plate column and with means for independently controlling and measuring the temperatures of the plates. The still is designed for distillation in a stream of an inert gas ( $CO_2$ ) without boiling. It is provided with a purifying train for the  $CO_2$ , with a series of condensers with stepped temperatures down to 80 deg. C. and with a final absorber for the  $CO_2$ .
3. A set of all-glass rectifying stills for vacuum distillation. These stills have vacuum-jacketed columns, mercury-sealed stopcocks, and provision for intermittent feeding of liquid and withdrawal of fractions during the distillation. They are heated by immersion in an electrically-heated bath of nickel shot.
4. Various types of molecular stills by means of which distillation can be carried out at temperatures at which the vapor pressure at the distilling surface is extremely low, o. g., even as low as 0.000001 mm. of mercury if necessary.
5. Methods and apparatus for fractionation by crystallization or melting.
6. An apparatus for combustion analysis with special provision for purifying the oxygen employed and with all rubber connections eliminated. With this apparatus the combustion of a hydrocarbon can be carried out with the following accuracy: %C and %H each to

about  $\pm 0.02$ . This makes it possible to determine with certainty the value of  $x$  in the formula  $C_n H_{2n} + x$  for any hydrocarbon up to  $C_{100}$ .

The change in the iodine number of the "wax-distillate" fraction of a petroleum oil produced by heating it for different periods and at different temperatures up to 370°C in (a) air and (b)  $H_2$ ,  $N_2$  and  $CO_2$  respectively, has been determined, and it is shown that in the absence of air this change is greatly reduced, thus making it possible to distill petroleum at high temperatures without cracking, provided all air is excluded.

## Standard Pressure Gages

THE American Engineering Standards Committee has been asked by the American Society of Mechanical Engineers to approve the establishment of national standards for pressure gages. Standardization of vacuum gages is also requested.

Grant of the request by the Standards Committee will be followed by the formation of a committee to undertake the work of gage standardization. Besides decreasing the accident hazard, it is expected that the work will benefit manufacturers and purchasers of gages by replacing the great number of sizes and types now being manufactured by a comparatively small number of standard sizes and types based upon the findings of the committee of technical experts.

The United States Navy Department has done much important work in establishing gage standards for the use of the Navy, and several private concerns, such as the Firestone Tire and Rubber Co., the General Electric Co., and the Pennsylvania Railroad Co., have established specifications for their own use. It is expected that these and other specifications will be studied and coordinated in a national way.

The standardization of pressure and vacuum gages may include, in addition to specifications for accuracy and temperature of calibration, such items as ratings of capacity; arrangement of graduations, numerals, indicator hand, and certain features of the interior mechanism, and the position of stop pins. Establishment of standards for test equipment and standard methods for testing gages have also been recommended to the American Engineering Standards Committee.

BEGINNING Oct. 1, higher speed limits for commercial vehicles will prevail in Great Britain. Commercial vehicles without trailers weighing without load not in excess of 4480 lb., when fitted with pneumatic tires will be subject to a speed limit of 20 m.p.h. instead of 12 m.p.h. as heretofore. Similar vehicles fitted with solid rubber tires or partly with solid and partly with pneumatic tires will be subject to a speed limit of 12 m.p.h. In the case of heavy motor vehicles with trailers attached, if both the motor vehicle and the trailer carry pneumatic tires, the speed limit will be 12 m.p.h. instead of 5 m.p.h. If tractor and trailer are fitted with solid tires or partly with solid and partly with pneumatic tires, the speed limit will be 8 m.p.h. instead of 5 m.p.h. The same order of the Minister of Transport which establishes these new speed limits provides for the compulsory carrying of a rear-view mirror, except on vehicles which carry a conductor at the rear, who can communicate signals received from drivers behind to the driver of his vehicle.

THE Royal Automobile Club of Egypt plans to hold its second annual automobile show in Cairo during the period January 23 to February 6, 1929.

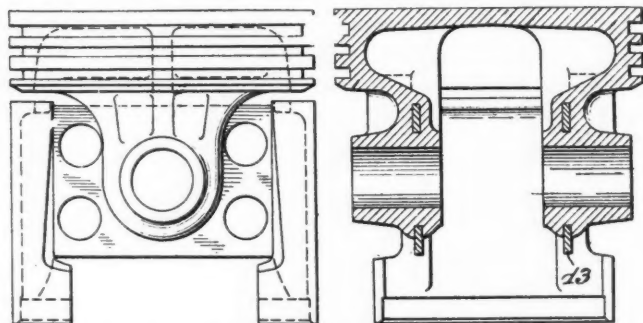


# Mathematical Theory of Invar-Strut Piston is Explained

Nelson patent shows method of determining proper strut size for any particular coefficient of heat expansion to obtain given overall expansion for certain temperature increase.

By P. M. Heldt

IN descriptions of new cars mention is often made of the fact that the engine is fitted with Nelson Bohnalite invar-strut pistons. It has been pointed out in these columns in the past that the object of the invar-struts is to control the heat expansion of the pistons



Figs. 1 and 2—Side view and section of Nelson invar-strutted piston

and thus permit of using a comparatively small clearance of the cold pistons without incurring risks of the pistons seizing when heated to the normal temperature, but the theory which permits of determining the proper size of the struts for any particular coefficient of heat expansion of the strut material in order to obtain a given overall expansion of the piston for a certain temperature increase, has never been published here; this subject is gone into at some length in a patent recently issued to A. L. Nelson, inventor of the invar-strut piston (U. S. Patent No. 1,681,709, Piston, issued Aug. 21, 1928).

The Nelson piston is familiar to most people in the automotive industry, but in order to make quite clear what the following discussion refers to, a side view and a section through the axis are reproduced herewith (Figs. 1 and 2).

Fig. 3 is a diagram representing an analysis of the expansion rate of the piston "skirt." Points A, B, C and D are neutral points in the joints between the slipper sections and the struts. A diameter through point A makes an angle  $\theta$  with the diameter parallel to the struts. Points E and F are opposite peripheral points in the diameter through A. The aluminum alloy of which the piston is cast is supposed to have a linear expansion of 0.00001234 per deg. Fahr.

In making an analysis of the expansion of the piston with low-expansion struts, the first step consists in determining the expansion between points E and F of Fig. 3. This expansion is then divided by that of a

solid cylindrical block of cast iron of the same diameter, such iron having a coefficient of heat expansion of 0.00000556 per deg. Fahr. Thus the solid cast-iron cylinder is used as a reference unit and the ratio of expansion defined above is known as the piston skirt expansion rate.

First the expansion between points A and B in Fig. 3 is calculated, and this is laid off to scale on an extension of AB, the line AG representing the value obtained. The calculations are based on a piston diameter of 3.375 in. and a temperature rise of 70-212 deg. Fahr., and in the drawing an expansion of 0.001 in. is represented by a length of 0.667 in. Next the expansion from D to A is calculated, the strut being assumed to be made of ordinary steel, which gives a value that is represented by the line GH. This value, of course, must be laid off at right angles to AG. By drawing the hypotenuse AH we have a line which represents the expansion between points A and C.

If we regard point A as fixed in space, then the movement of point C due to the heat expansion evidently is not in the direction of the original line AC but at an

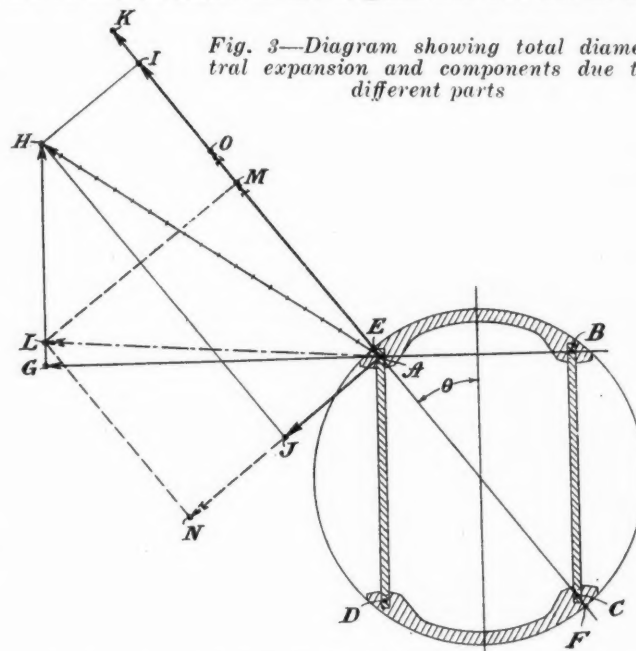


Fig. 3—Diagram showing total diametral expansion and components due to different parts

angle thereto, and Mr. Nelson resolves the expansion AH into two components, a normal component AI (in line with AC) and a tangential component HI. The

former component, *AI*, represents the diametral expansion between *A* and *C*, while *HI* represents peripheral creep of the point *A* over the cylinder wall.

To obtain the total diametral expansion of the piston skirt we must add to *AI* the expansions between *A* and *E* and between *C* and *F*. In the particular example which is the subject of this analysis, *AE* is 3.55 per cent of the piston diameter. *AK* represents the total expansion from *E* to *F* on the diameter of the piston through point *A*.

On the diagram just discussed there is superimposed another for a strut material having a coefficient of expansion of 0.00000636 per deg. Fahr. or one-tenth that of ordinary steel. The expansion between points *A* and *B* is the same in this case, while the expansion between *A* and *D* is represented by *GL* and the total movement between *A* and *C* by *AL*. The normal component of this is *AM*, and by adding the expansion due to the aluminum sections *AE* and *CF*, we get *AO* for the total diametral expansion, while the tangential expansion is represented by the distance *AN*.

It is apparent from these diagrams that when a strut material with a low coefficient of expansion is used, the resultant normal to the skirt wall is materially decreased while the tangential resultant is greatly increased. It will also be observed that an increase in the angle  $\theta$  decreases the length of the strut and increases the cord *AB* of the skirt, thereby changing the resultant expansion of the skirt.

Materials with suitable coefficients of expansion are available in commercial nickel-iron alloys. Fig. 4 shows how the coefficient of linear expansion of such alloys varies with the nickel content. Plotted values of the coefficient between 31 and 36 per cent nickel, as given by different authorities, agree very well, and since this is the flattest part of the curve, commercial products can be kept within reasonable distances of the curve. The change in the coefficient of heat expansion is quite rapid, however, between 26 and 31 per cent nickel, and this part of the curve is not so reliable. The material used for the struts must have a consistent coefficient of expansion within commercial limits, and hence materials with from 31 to 36 per cent of nickel should be used.

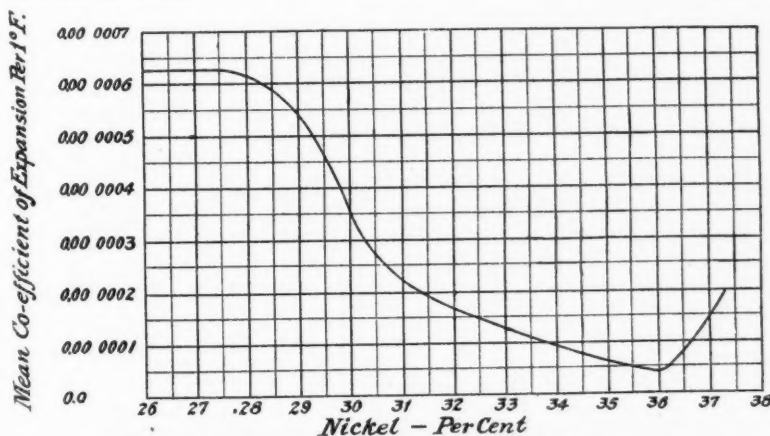


Fig. 4—Heat expansion coefficients of nickel-iron alloys as dependent upon nickel content

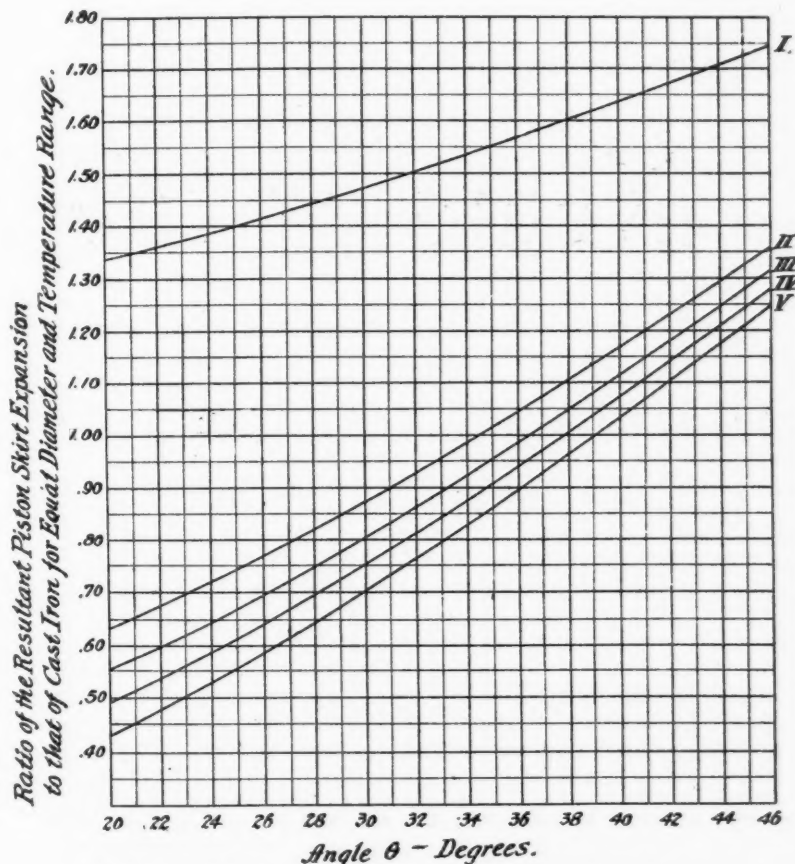


Fig. 5—Skirt expansion ratios with different strut materials for different values of angle  $\theta$

In analyzing the subject of the design of pistons with low-expansion struts, five different strut materials were figured with, viz.: (1) ordinary steel having a coefficient of expansion of 0.00000636; (2) a nickel-iron alloy with 32.2 per cent of nickel, which has a heat expansion coefficient of 0.00000159; (3) a nickel-iron alloy with 33.6 per cent of nickel, which has a coefficient of heat expansion of 0.00000109; (4) a nickel-iron alloy with 35.1 per cent of nickel, which has a coefficient of heat expansion of 0.000000636, and (5) a nickel-iron alloy with 36 per cent of nickel, which has a coefficient of heat expansion of 0.000000226.

A diagram for skirt expansion was drawn for each of the above five materials and for values of the angle  $\theta$  varying in steps of 2 deg. from 20 to 46 deg., and the skirt expansion found from each diagram was divided by the expansion, due to an equal temperature rise, of a solid cast-iron cylinder of the same diameter, to obtain the piston skirt expansion rate. In Fig. 5 these expansion rates are plotted as ordinates against values of angle  $\theta$  as abscissas.

Fig. 5 clearly shows the relation between the strut material and the value of angle  $\theta$ . It will be seen that with these five materials, if the value of the angle  $\theta$  can be varied between 20 and 46 deg., any expansion rate from 43 per cent to 175 per cent of that of a cast-iron piston can be obtained.

For instance, if a skirt expansion rate of 1 is wanted, which is suitable for an automobile engine piston, if invar is to be used for the strut, the angle  $\theta$  must be chosen at 39 deg. If actual tests of the piston in the engine should show that a slightly higher expansion ratio would be desirable, expansion rate of 1.10 might be adopted.



First with  
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# News of the Industry

PAGE 422. VOLUME 59

Philadelphia, Saturday, September 22, 1928

NUMBER 12

## M.&A.M.A. Index in August Sets Monthly Record of 212

Original Equipment Manufacturers Score Second Highest  
Month—Parts Accessories and Garage Equip-  
ment Show Sharp Upturns

NEW YORK, Sept. 22—The automotive and accessory business in August had the greatest month in its history. While car and truck manufacturers were setting a new monthly record, makers of engines, bodies, and other original equipment naturally were operating at high levels. They fell a little short of the peak attained in March, which was their record, but exceptionally large August volume in service parts, accessory and service equipment brought factory shipments for the parts industry generally to a point never before reached, according to the Motor & Accessory Manufacturers Association.

Preliminary reports of September production and distribution indicate another high month.

The index of aggregate shipments to the car and truck manufacturers and the wholesale trade by a large and representative group of M. & A. M. A. members in August was 212, comparing with 207 in March and 201 in May this year. August last year was 155.

For original equipment makers August was the second greatest month. The shipments index was 230 as compared with 203 in July and 155 last August. The March index was 231.

Service parts makers had an index of 176, their third greatest month. The July index was 148 and August last year 169. Accessory sales to the trade showed their most vigorous upturn of the year. The index of shipments was 147 as compared with 112 in July and 115 in August, 1927. Makers of service equipment had an August index of 148 as compared with 120 in July and 134 in August last year.

### Olds Adds Five Acres

LANSING, Sept. 18—Olds Motor Works has acquired five acres of land adjacent to its main factory. No definite plans have been made for the use of the land, but it will be cleared of all buildings and enclosed.

## Factories Continue Near August Level

PHILADELPHIA, Sept. 20—From present indications, this month's production will fall under the August level but the principal reason is the fewer number of working days. The large producers, in the main, have kept output up to the best figures of last month. A slight tendency to curtailment is currently observable.

Both foreign and domestic demand has accounted for the strong production of recent months, and continues to be above normal for the season. Whether the industry will experience the sharp reduction in activity that has characterized the closing months of the last two years remains to be seen, but the fact that Ford will be increasing output for some months to come is a guaranty that the early winter months will maintain a good ratio of increase over last year's marks.

### Von Schlegell Leaves Hupp, Cole and Graham Promoted

DETROIT, Sept. 18—Arthur von Schlegell, first vice-president, secretary and treasurer of Hupp Motor Car Corp., has resigned but will continue as a director. Ralph P. Lyons, formerly comptroller, was elected treasurer, and George E. Roehm, formerly assistant secretary, was elected secretary.

R. S. Cole, general sales manager, was elected vice-president in charge of sales, and W. S. Graham, formerly production manager, was elected vice-president in charge of manufacturing.

### Eaton to Expand Plant

CLEVELAND, Sept. 20—Eaton Axle & Spring Co. will erect an additional factory building at a cost of \$1,000,000 which will add 120,000 sq. ft.

### Ford Canada Plant Abreast of Orders

DETROIT, Sept. 20—Ford Motor Co. of Canada, Ltd., built 13,045 cars and trucks in August bringing the total production of the Model A in Canada to date to about 48,000. The company is nearly caught up with orders and dealers are able to give immediate deliveries on some models and others within a few days. The company reports the receipt of orders continuing in large volume. The company is shipping about 30 per cent of its current production abroad.

### Durant 8 Months' Sales 8 Per Cent Over All 1927

NEW YORK, Sept. 19—T. S. Johnston, assistant to W. C. Durant, president of Durant Motors, Inc., in addressing, at the Durant Elizabeth, N. J., plant, a national convention of Durant branch managers, said Durant sales for the first eight months of 1928 exceeded by more than 8 per cent the total 1927 Durant sales record.

In addition to increased activity at the Elizabeth plant, a like condition exists at the Oakland, Cal., and Leaside, Ont., plants, while at the Lansing plant the \$1,250,000 addition is being rushed to completion so production may be put on a full schedule as soon as possible, Mr. Johnston said.

### McCarthy Leaves Durant

ELIZABETH, N. J., Sept. 17—J. P. McCarthy, whose resignation as vice-president and factory manager of Durant Motors, Inc., was effective Saturday, was given a farewell dinner by fellow executives of the plant. C. L. Allen will become factory manager.

### Triplex Adds Directors

NEW YORK, Sept. 20—W. R. Timken, H. E. Talbot, Jr., and H. T. Dickinson have been elected directors of the Triplex Safety Glass Co. of North America. W. C. Alcorn, formerly general manager of the stamping division of Transue & Williams Co., has been appointed general manager.

## U.S. Plants Build 458,429 in August

### Passenger Car Output Exceeds 400,000 Mark in Month for First Time

WASHINGTON, Sept. 20—August production of trucks and passenger cars in the United States, reaching a total of 458,429, of which 400,689 were passenger cars, breaks all previous records in automotive industrial history.

The figures compiled by the Department of Commerce from 155 manufacturers in the United States show an increase of 48 per cent in total production during August over August, 1927, and an increase of 17 per cent over July, this year.

The previous high record of October, 1925, when 442,111 passenger cars and trucks were produced, was eclipsed by more than 16,000 units. Never before in the United States, according to revised figures of the Census Bureau, has any one month seen the production of 400,000 passenger cars, although the high mark of September, 1925, for trucks—when 58,651 trucks were produced, was missed by less than 1000 trucks during August, 1928, which witnessed output of 57,740 vehicles of this classification.

## Rich and Wilcox Merger Approved by Stockholders

DETROIT, Sept. 18—Consolidation of the Rich Products Corp. and the Wilcox Products Corp., to go into effect Oct. 1, was approved today in a meeting of stockholders. The two companies will be merged through an exchange of stock into a new company to be known as the Wilcox-Rich Corp. Capitalization of the new company will be 92,000 shares class "A" non par value, convertible preferred stock authorized and outstanding. Class "B" non-par common stock, 227,000 shares authorized, 135,000 shares outstanding. The class "A" stock will carry a \$2.50 annual dividend rate, will be callable at \$35 a share and convertible share for share into the class "B" stock.

## P.-A. Offers 10-Ton Truck

BUFFALO, Sept. 20—A new 10-ton truck designated as the Model RG and listing at \$5,950 is announced by the Pierce-Arrow Motor Car Co. It is powered by a 70 hp. four-cylinder, dual-valve, dual-ignition engine, has a four-speed transmission, power braking system and worm drive rear axle and is offered in two wheelbases, a standard length of 14 ft. and a tractor size of 12 ft. Gross vehicle weight is 36,000 lb. The chassis weight is 11,500 lb., leaving a balance of 24,500 lb. for body and pay load.

## Ford Lowers Battery Price

DETROIT, Sept. 19—The new Ford storage battery is to sell for \$8.50, a

reduction of \$2.50 from the former price. The first of the Ford storage batteries for Ford automobiles, made in 1921, sold for \$25. A year later the production had become heavier and the company announced a reduction to \$20. By 1924 the price had been reduced to \$16.50. Two years later, in 1926, increased production had resulted in a cut to \$15. In 1927 a further price reduction to \$12 was made and later in the same year to \$11.

## Kaufman Heads Sales of Chrysler-Fargo

DETROIT, Sept. 20—The Chrysler Corp. has announced itself as the builder of the Fargo line of trucks and commercial vehicles whose forthcoming appearance was announced about a month ago. The first two models to be built are of  $\frac{1}{2}$ -ton and  $\frac{3}{4}$ -ton capacities. One,  $1\frac{1}{2}$  and 2-ton models will be added later.

Harry A. Kaufman, formerly a sales executive of the Graham Brothers Division of Dodge Bros. Corp., will be in charge of Fargo sales.

The  $\frac{1}{2}$ -ton model will be known as the Fargo Packet and the  $\frac{3}{4}$ -ton as the Fargo Clipper. Both models will show influences of passenger car design.

The Fargo Express line will be sold by the Fargo Motor Corp., a recently formed division of the Chrysler Corp. Distribution will be through Chrysler, De Soto and Plymouth dealers as well as through dealers of other organizations under separate sales agreement.

## Packard Radial Diesel is Used in Test Flight

DETROIT, Sept. 20—A radial Diesel type air-cooled engine built by Packard Motor Car Co., was used in a test-flight yesterday in a standard Stinson Detroit monoplaner. It was the first time that an engine of this type has been in the air.

The engine is rated at 200 hp. and weighs less than three pounds per horsepower. Details of design are withheld pending final experimentation and the start of production which is not expected for several months.

Aircraft engine manufacturers have been experimenting with engines of this type as means of eliminating troublesome accessories and lowering fuel consumption with increased cruising radius.

## Storm Effects Limited

PHILADELPHIA, Sept. 20—Early reports on the storm in Florida indicated that damage to automobile establishments would be much less than was caused by the previous disaster. It is recalled that the last storm caused a severe decline in the new and used car market, but that dealers profited to some extent from the large amount of repair and refinishing work called for. As sales in Florida have been poor for some time, the effect of the current storm on the local market will have little, if any, national significance.

## Business in Brief

Written by the Guaranty Trust  
Co., New York, exclusively for  
AUTOMOTIVE INDUSTRIES.

NEW YORK, Sept. 19—Weather conditions during the past week have not been very favorable to general trade. The continued warm weather and high humidity of the summer have not stimulated the movement of fall goods. However, the cotton belt enjoyed ideal weather for harvesting the crop, and cotton prices fell 4 cents a pound for middling during the week ended September 14.

### POWER CONSUMPTION

Consumption of electricity in the major industries in August, according to reports received by the "Electrical World," was 7.6 per cent larger than in the corresponding month last year.

### FREIGHT CAR LOADINGS

Car loadings for the week ended Sept. 1 totaled 1,116,948 cars, which represents an increase of 36,108 cars above the total for the preceding week and a decrease of only 412 cars below that for the corresponding week in 1927.

### BUILDING CONSTRUCTION

Building during the present year will aggregate in value more than \$3,000,000,000, which compares with a building value of approximately \$2,225,000,000 during the previous year, according to an estimate by the Indiana Limestone Co.

### FISHER'S INDEX

Professor Fisher's index of commodity prices for the week ended Sept. 15 was 100.3, as compared with 99.7 the week before.

### BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Sept. 12 showed an increase of 4 per cent, as compared with the total for the corresponding week last year.

### FEDERAL RESERVE REPORT

The combined Federal Reserve statement of Sept. 12 showed increases of \$24,400,000 in holdings of bills bought in the open market and \$15,000,000 in holdings of United States Government securities. There was a decline of \$10,900,000 in holdings of discounted bills, which takes into account an increase of \$6,200,000 in this item in the New York district.

## German Merger Progresses

WASHINGTON, Sept. 20—Advices to the Department of Commerce from Frankfort, Germany, state that rumors about the German motor car trust, heard on the stock exchange, are gradually taking more definite shape. According to latest reports, the following firms are likely to join the combine: Adlet, Daimler-Benz, N.A.G., Hansa-Lloyd, Horch, Magirus, N.S.U., Gothaer Waggonfabrik and Bayerische.



## Research Club Joins With Super-Service

Organizations Will Work Cooperatively But Maintain Separate Identities

CHICAGO, Sept. 17—In line with the rapid trend toward mergers and cooperative combinations, the Research Club and the Super-Service Corp. have just concluded a cooperative arrangement whereby their activities are federated without actually merging the two organizations, it was announced here by President George B. Shearer for the Research Club and President N. F. Ozburn for the Super-Service Corp.

The organizations will retain their separate identities, but will operate from a consolidated office in the Strauss Building, Chicago, with an enlarged staff to give to both institutions the services each has previously had from its own headquarters, plus such additional activities as the new cooperative agreement will make possible. The federated membership will be 46.

There will be joint responsibility for the supervision of the work previously carried on by the organizations separately. The various studies and researches now in progress or to be undertaken will be financed jointly. Additional forms of service will be made available to the federated membership, especially on jobber operating costs and merchandising procedure. Particular attention is to be given to the whole field of competition in its present state of rapid change, and to the adjustment of sales effort to the new competition.

A definite and practical program of jobber supply to the aviation industry, which will be under the general direction of R. R. Dunn, merchandise manager of the Research Club, will be presented in published form as an "Aviation Supply Catalog," as one of the first official publications following the federation, it was announced by J. H. Mehan, general manager of the Research Club.

### Will Retain Special Brands

The special brands and other merchandise items identified with the two organizations will be retained under their original names. It is expected, however, that the cooperative agreement will enlarge the contracts for bulk goods as compared with contracts placed previous to the agreement.

Changes will be made in the plans for the annual meetings of the two organizations which are scheduled for Oct. 17-20 at the Edgewater Beach Hotel, here. There will be two days of joint sessions and two days of separate meetings, instead of the previous practice of four-day separate sessions. During the A.E.A. Convention, Oct. 22-27, headquarters for the entire cooperative group will be maintained at the Blackstone Hotel.

## Insurance Company Quits in Bay State

NEW YORK, Sept. 15—Compulsory liability insurance as practiced in Massachusetts has produced a rate condition which has forced one of the large companies to discontinue this type of insurance in that state. The New York Indemnity Co. yesterday formally notified the insurance commissioner of Massachusetts to the effect that because of the inadequacy of rates for automobile liability insurance business in Massachusetts its representatives in that state have been instructed to discontinue such business.

According to this notice, these rates would result in a net loss to the company estimated between \$100,000 and \$200,000 for this year.

## Trailer Co. of America Organized in Cincinnati

CINCINNATI, Sept. 15—The Trailer Co. of America, organized in Cincinnati as a holding company, has acquired a substantial interest in the Trailmobile Co. of Cincinnati and the Lapeer Trailer Corp. of Lapeer, Mich. The two companies will operate as separate manufacturing and selling organizations under the supervision of J. Englander, president; S. B. Winn, vice-president and general manager, and A. J. Woltering, secretary and treasurer.

Organization of the Trailer Co. of America strengthens the resources of the company and makes available additional capacity. The Trailmobile Co. for a number of years has been manufacturing trailers, with C. W. Shipley, who retired recently, as president, and was succeeded by Mr. Englander. Directors of the holding company are L. W. Childress, St. Louis; Mr. Englander, Mr. Winn, Frank H. Simpson and Herman Bayless.

## Auto-Lite Sales Double

TOLEDO, Sept. 17—Regular quarterly dividend of \$1 a share on common and \$1.75 a share on preferred, payable Oct. 1 to holders of record Sept. 20, has been declared by the Electric Auto-Lite Co. Total distribution will be about \$950,000. September business of the company will run about two and one-half times what it was in the same month last year, according to C. O. Midliger, president.

## Makes Fender Shields

SPRINGFIELD, MASS., Sept. 17—A new adjustable fender shield has been put on the market by the Hampden Auto Top & Metal Works. It is adjustable to any length of fender by a tube arrangement.

## Fisher Coast Plant Will Cost \$500,000

Unit Will Supply Eleven Western States With Parts and Maintenance Service

OAKLAND, CAL., Sept. 17—On the heels of the announcement of a \$7,000,000 plant in Oakland for the Chrysler Corp., comes the disclosure by the Oakland Chamber of Commerce that this city is to be the home of a Fisher body plant costing \$500,000.

From this plant Fisher bodies will be distributed to 11 Western States. It will be located in Emeryville, and will embody the latest in factory building design and equipment. It will occupy an entire block and will cover 63,000 ft. of ground space. The land and building will cost \$150,000, the balance being devoted to equipment and furnishings. More than 100 men will be employed and several departmental foremen will be brought from Eastern headquarters.

In addition to serving the 11 Western States involved as a complete body parts depot, a thoroughly equipped service repair plant will be maintained, new body service to be offered for all Fisher bodies used on all makes of cars.

The increase in Western business, the volume of which has become tremendous and the fact that approximately two weeks' time can be saved in delivery of the product are given as reasons for building here.

## Martin Heads Sales of Lubricating Equipment

CHICAGO, Sept. 17—W. F. Martin, for several years president and general manager of the Romar Products Corp., Chicago, has resigned and disposed of his interests. Romar Products will continue under the guidance of C. P. Kraft, at the new address, 4848 Sheridan Road, Chicago.

Mr. Martin has been elected vice-president in charge of sales of the Lubricating Equipment Co., manufacturer of the Leco cylinder lubricator, Chicago. Other officers and directors of the Lubricating Equipment Co. are: H. C. Kibbey, president and general manager, and William Yeschek, secretary and treasurer.

## G. M. of Canada to Build

OSHAWA, ONT., Sept. 17—R. S. McLaughlin, president of General Motors of Canada, Ltd., has announced that an extension to the Walkerville plant of General Motors will be made at a cost of approximately \$500,000. It is stated that manufacture of engines in Canada will be started at this plant. Plans and specifications for a new truck and bus assembly plant are being prepared and it is expected that the work will be started immediately to permit early production.

## G.M. Sales Increase 294,075 in 8 Months

August Total of 187,463  
Brings Business for Year  
to 1,427,924

NEW YORK, Sept. 17—General Motors Corp. dealers sold 187,463 cars at retail during August, according to announcement made by Alfred P. Sloan, Jr., president. This compares with 158,619 cars for the corresponding month last year, a gain of 18.2 per cent, and with 177,728 for July of this year. Retail sales in the first eight months total 1,427,924 as against 1,133,849 in the 1927 period.

Sales of General Motors divisions to dealers for August totaled 186,653 cars as compared with 155,604 for the same month in 1927, a gain of 20 per cent, and with 169,473 for July of this year. Eight months' sales to dealers were 1,439,442 as against 1,175,990 in the 1927 period.

Comparable tables for the first eight months of the current year with the corresponding periods of last year follow:

Dealers' Sales to Consumers	1928	1927
January.....	107,278	81,010
February.....	132,029	102,025
March.....	183,706	146,275
April.....	209,367	180,106
May.....	224,094	171,364
June.....	206,259	159,701
July.....	177,728	134,749
August.....	187,463	158,619
Total.....	1,427,924	1,133,849
Division Sales to Dealers	1928	1927
January.....	125,181	99,367
February.....	169,232	124,426
March.....	197,821	161,910
April.....	197,597	169,067
May.....	207,325	173,182
June.....	186,160	155,525
July.....	169,473	136,909
August.....	186,653	155,604
Total.....	1,439,442	1,175,990

## G.M. Adds Stockholders

NEW YORK, Sept. 19—Stockholders of General Motors Corp., including both common and preferred stock, for the third quarter of 1928, number 71,682 as compared with 70,399 in the previous quarter. This also compares with 57,190 for the corresponding quarter of 1927.

## Tractor Exports Increase

MINNEAPOLIS, Sept. 17—Foreign orders for tractors and farm machinery have established a new record for the Minneapolis Steel & Machinery Co. H. J. Blakeslee, manager of foreign sales, has gone to establish a sales organization in Algeria. Total volume for the company will be 30 per cent above 1927 and capacity volume at the plant will continue later this fall than ever.

## M. & A. M. A. Members to Vote on Merger

NEW YORK, Sept. 17—The Motor & Accessory Manufacturers Association has called a special meeting of its members for the purpose of ratifying the merger between that association and the Automotive Equipment Association. This meeting is to be held Sept. 25, 2.30 p. m. at the Hotel Astor, New York. There will also be a directors' meeting some time during the same day.

## August Payroll Increase Largest in Six Years

WASHINGTON, Sept. 20—An increase of 1.5 per cent in employment and 9.2 per cent in payroll totals in manufacturing industries of the United States—the greatest gain in 6 years—was recorded by the bureau of labor statistics of the Department of Labor for August over the preceding month.

Increased employment in August is a usual occurrence due to completion in July of inventory-taking and repairs but such an increase as above cited is greater than in the last five years.

The statistics for August are based on returns made by 11,097 establishments in 54 of the principal manufacturing industries of the United States, with 3,111,655 employees on their payrolls which amount weekly to the combined total of \$84,249,130.

Outstanding increases in employment percentages were noted in the automobile industry in August over July, while 39 other industries also showed advances. The gain in the automobile industry's employment amounted to 31.2 per cent this August over August, 1927.

## Erie Malleable Changes Wheel Division Name

ERIE, PA., Sept. 17—For several years the Erie Malleable Iron Co. has been operating its wheel division as the "Van Metal Wheel Division," manufacturing "Van" wheels. This has caused confusion as Van Wheel Corp., Oneida, N. Y., under whose patents Erie Malleable wheel division has been operating, also markets its wheels under the same name.

In the future the wheels manufactured by Erie Malleable will be marketed under the name of "Erie Malleable Wheel's" manufactured by the "Automotive Wheel Division" of the company.

## Willys Opens Sales Office

CHARLOTTE, N. C., Sept. 17—Sales and distribution control headquarters for the business of the Willys-Overland Co. in North Carolina and South Carolina were established here under the direction of F. M. Brown.

## August Levels High, Labor Study Shows

Automotive Plants on Large  
Schedules—General Em-  
ployment "Satisfactory"

WASHINGTON, Sept. 20—Automobile factories and allied plants worked on high-production schedules and in some localities employed additional labor during August, according to the monthly survey of employment conditions throughout the country, compiled by the Department of Labor. The general industrial employment situation was termed "very satisfactory" by the department for the month. With few exceptions, it was reported, the major industries of the country operated on good employment schedules.

Reports from the agents in various sections of the United States, concerning the automotive and allied industries, were received as follows:

**Michigan**—Increased activity was noted in plants manufacturing automobiles and accessories. Detroit: A small surplus of unskilled automobile factory workers was apparent. Two large automobile factories operated three shifts at Highland Park. Grand Rapids: Plants manufacturing automobile bodies and tools and dies operated overtime, with a shortage of skilled help reported in the metal trades. Flint: Several departments in larger automobile factories worked overtime during the month; shortage of skilled automobile-factory labor reported. Lansing: Contract has been let for a \$1,000,000 addition to a motor factory.

**Wisconsin**—Plants manufacturing automobiles and agricultural implements operated with full forces employed in most instances. Racine: A large rubber factory and an automobile plant operated overtime. Kenosha: Shortage of competent help reported in automobile industry. Automobile factories worked overtime.

**Ohio**—Factories manufacturing automobile tires worked on very satisfactory schedules. Automobile factories operated with large forces employed. Cleveland: The automobile factories reported full schedules. Toledo: Automobile accessory plants worked with night shifts. Akron: Factories producing rubber tires and tubes operated on peak schedules and the larger factories worked three shifts. One large tire and rubber plant, closed for six weeks, reopened in August with a large force. Warren: A new rubber factory recently located in Newton Falls, nearby, has employed a night force. Lorain: A large tube mill operated at 95 per cent capacity.

**New York**—Factories manufacturing automobile accessories worked overtime.

**Indiana**—Evansville: Building includes erection of \$1,000,000 factory for automobile body plant, to be completed early in November, when approximately 1200 will be employed.

## Chisholm Moore Moves

TONAWANDA, N. Y., Sept. 17—The general offices of the Chisholm Moore Hoist Corp. are now located in this city. A complete line of hoists will be carried at Cleveland and a branch office maintained there.



# Men of the Industry and What They Are Doing

## Welding Society to Hear Automotive Specialists

Speakers representing the automotive and aircraft industries who will speak at the fall meeting of the American Welding Society in Philadelphia, Oct. 8 to 11, include J. W. Meadowcroft, assistant works manager of the Edward G. Budd Mfg. Co., who will speak on "Welding in the Automobile Industry," and H. L. Whittemore of the Bureau of Standards, and H. H. Moss of the Linde Air Products Co., who will speak on "Testing Joints for Aircraft Structures Prepared Under Procedure Specifications."

S. W. Miller of the Union Carbide & Carbon Research Laboratories will speak on the "Formula for Computing Design Stresses for Pressure Vessels."

Inspection trips will include visits to the Budd plant and to an airplane manufacturing plant.

## Baker Leaves Caterpillar

Announcement of the resignation of Murray M. Baker, vice-president and chief sales executive of the Caterpillar Tractor Co., has been made by George L. Bell, second vice-president, and appointment of E. R. Galvin, company's representative at Cleveland, as division sales manager at Peoria, was made. Mr. Baker will continue as a member of the board of directors.

## Visit Shows With Willys

H. C. Tillotson, president of the Tillotson Mfg. Co., W. W. Mountain, president of the Mountain Varnish & Color Works, and T. A. Russell, president of Willys-Overland, Ltd., of Toronto, are accompanying John N. Willys on his trip to visit the Paris and London shows.

## Gilbert Goes Abroad

James L. Gilbert, business manager of El Automovil Americano and the American Automobile (Overseas Edition), has sailed for Europe, where he will visit the Scandinavian countries and Germany and will attend the Paris and London shows.

## Moiles With Trust Company

Stanley B. Moiles, assistant industrial engineer at the Briggs Mfg. Co. for the past five years and associated with the automotive industry for 15 years, has joined the new business department of the Metropolitan Trust Co.

## Franklin Names Export Men

William L. Nicoll and Sidney Watson have been appointed special traveling representatives of Franklin Automobile Co., the former in Europe and the latter in Latin America. Mr. Nicoll recently was with Marmon and Mr. Watson with Remington Arms in the export field.



**Robert Insley**

*Head of the aeronautical division of Continental Motors Corp.*

## Power Heads Lyon Division

Earl D. Power has been made manager of the automotive division of Lyon Metal Products, Inc., Aurora, Ill. Mr. Power came to the Lyon organization several months ago from the White Co., Cleveland. During seven years of association with that company Mr. Power was, after the first three years, parts service manager in charge of the main parts department at Cleveland.

## Pomeroy Joins Daimler

L. H. Pomeroy, well-known British automotive engineer who resided in this country for several years, has recently been appointed general manager of the Daimler Co., Ltd., Coventry, England. Mr. Pomeroy's most important work in the United States was in connection with the development of aluminum engine parts for the Aluminum Co. of America.

## McReavy Takes Post

Lt.-Comdr. James McReavy, U. S. Navy, (retired), has joined Black & Bigelow, Inc., New York, with whom he will undertake work related to the inspection, operation and maintenance of airplanes.

## Livingstone N.S.P.A. Director

Charles L. Livingstone of the Vellumoid Co., Boston, has been appointed a director of the National Standard Parts Association by President L. T. White to fill the vacancy caused by the resignation of James C. Gay.

## Klauss India President

W. G. Klauss, Chicago, has been named president of India Tire & Rubber Co., succeeding J. M. Alderfer, who has been named chairman of the board.

## Daimler-Benz President Arranges Showing Here

Carl Schippert, president of the Daimler-Benz Aktien Gesellschaft, is at present in this country on a combined business and pleasure trip. He is making arrangements for space in the New York and Chicago automobile shows for exhibition of his cars, and plans to spend a week in Detroit and a certain time visiting other centers of the American automotive industry.

He will return to Europe in time for the Paris salon in October.

Mr. Schippert is also much interested in the application of a special Diesel engine to motor truck use and is considering its possibilities in the American market while here.

## Studebaker Makes Promotions

D. R. Grossman, vice-president and general manager of the Studebaker Corp. of Canada, Ltd., has appointed F. J. Cosford, formerly assistant sales manager, to sales manager for the Dominion of Canada. G. F. MacKay has been appointed assistant sales manager. Mr. MacKay has just recently returned from Constantinople, where he served two years as Studebaker representative. B. Caldecott, who has been connected with the company for a number of years, has been made assistant to Mr. Grossman.

## Armstrong Urges Traffic Code

Richard S. Armstrong of the legal department of the National Automobile Chamber of Commerce, spoke before the Maine state automobile association and the governor of Maine, Sept. 30 on behalf of the uniform highway traffic ordinance recently recommended by the Hoover conference. The purpose of the meeting was to study this ordinance and make plans for its adoption by Maine during the coming legislative session.

## Olds Names New Managers

H. A. Trevelyan has been appointed Chicago branch manager of the Olds Motor Works, and L. J. Blunden, former Chicago branch manager, has been appointed regional manager of the new Mid-West regional office in Kansas City.

## Sherman Publicity Manager

H. H. Sherman has been appointed publicity manager of the Chicago Pneumatic Tool Co., with headquarters in New York.

## Hambly Back From South America

Frank L. Hambly, export manager of Marmon Motor Car Co., has returned from a two months' trip to South America. He will leave late in September to attend the European shows and visit distributors.

## Greater Parts Buying Foreseen by Graham

Says Car Makers Will Patronize Efficient Producers and Avoid Expansions

CINCINNATI, Sept. 15—The volume of car manufacturer purchases from parts makers will show a steady upward trend, according to George M. Graham, vice-president of Willys-Overland Co., in an address before the annual dinner of the Ohio Council of the National Automobile Dealers Association. Mergers in the parts field during the last 18 months have involved companies having total assets of \$250,000,000, Mr. Graham said, and these combinations have resulted in stronger, more efficient units which are better able to carry on development work and to manufacture economically. As a consequence, car makers will depend on equipment manufacturers to a greater extent than in the past and thus avoid expensive expansions of their plants, he said.

Other high-spots in the current situation mentioned by Mr. Graham were the tremendous effort that is being made to secure originality in body design, the proper time to announce new models and the Ford situation. In regard to the latter point, Mr. Graham said that Ford probably had not made any money up to the present time and that he is likely to look to increased volume for his profits. In 1929 the Ford factories will be ready to produce at capacity and Mr. Graham believes that all cars selling at less than \$1,000 will feel the effect of this competition.

## Manganese Association Would Develop Resources

WASHINGTON, Sept. 17—Cooperation of Congress, railroads and the steel industry in developing the manganese resources of the country in order to make the United States independent of foreign sources of this mineral was sought by the American Manganese Producers Association at its first annual convention here.

Congress will be asked to aid in stimulating development of the industry through more adequate appropriations for studies by government agencies of unsurveyed manganese areas and the production of the finished product for military and industrial uses. Speakers referred to sources of supplies of manganese in Southern and other sections of the country, particularly in Arkansas, Virginia, Alabama and Georgia.

## Mooney Calls Conference

NEW YORK, Sept. 22—J. D. Mooney, president of General Motors Export Co., today issued a call for a regional and managing directors' conference to be held in the United States beginning May, 22, 1929. Executive

heads of all the overseas assembly plants and warehouse operations of General Motors will attend a week's conference to be held at Shawnee-on-Delaware, will visit each of the General Motors automobile, truck and body factories in Detroit, Flint, Pontiac, Lansing, Oshawa, the research laboratories at Detroit and the proving ground at Milford, Mich.

Twenty-six delegates will attend from Europe, South America, the Far East and the Caribbean.

## Graham-Paige to Build Engineering Laboratory

DETROIT, Sept. 19—A complete engineering laboratory, also a car test building surrounded by a concrete test-track, have been added by Graham-Paige Motors Corp. to its expansion program at the Warren Avenue plant. Work on both buildings has begun. The engineering laboratory will be 300 x 60 ft., two stories high; the car test building will be 480 x 100 ft. The combined floor area of the new structures will be 84,000 sq. ft.

The cost of the buildings without equipment will be \$200,000. Besides these buildings, an addition to the main powerplant, with new boilers and power equipment has been begun.

The engineering laboratory will be of concrete throughout. The first floor will be devoted to a chassis and engine experimental laboratory; on the second floor will be an experimental body room, machine shop, drafting room, and offices for the entire engineering staff. Plans call for complete equipment of the latest type.

## Jordan to Issue Stock

CLEVELAND, Sept. 20—Notices have been sent to stockholders of Jordan Motor Car Co. advising that 74,000 shares of unissued treasury common stock will be offered to holders of record Sept. 25 at \$8 a share in proportion to holdings. Proceeds of the sale will be used, it is understood, for additional working capital. Further features of the company's finance plans will be announced in 30 days, E. S. Jordan, president, said.

## Detroit Banks Merge

DETROIT, Sept. 18—Of interest to the automotive industry is the merging of the Union Trust Co., the National Bank of Commerce and the Griswold-First State Bank through which a \$150,000,000 Detroit banking institution is created. It is expected that headquarters of the three institutions will be housed in the new Union Trust Building, now nearing completion.

## Offers New Axle Shafts

POTTSTOWN, PA., Sept. 18—U. S. Axle Co. is offering a complete new line of bus and truck axle shafts, including current models. Replacement axle shafts for many of the new passenger car models also are being placed on the market.

## Financial Notes

Stewart-Warner Speedometer Corp. reports net income for the six months ended June 30 after all charges of \$3,613,334. This is equivalent to \$6.02 a share and compares with \$2,570,926, or \$4.28 a share, for the corresponding period a year ago. Income for the quarter ended June 30 was \$2,226,050 as compared with \$1,508,878 for the corresponding quarter of last year.

E. W. Bliss Co. will pay dividends of \$1 a share on the first preferred stock; 87½ cents a share on the second preferred stock class A; 15 cents a share on the second preferred stock class B, and 25 cents a share on the common stock, on Oct. 1 to stock of record Sept. 18.

Bohn Aluminum & Brass Corp. has increased its Oct. 1 dividend from 37½ cents to 75 cents a share, the rise following large increases in earnings during the year to date.

Waukesha Motor Co. has declared a regular quarterly dividend of 62½ cents and an extra dividend of \$1, both payable Oct. 1 to holders of record Sept. 15.

Indian Motorcycle Co. has declared 1½ per cent quarterly preferred stock dividend payable October 1 to holders of record Sept. 24.

Marlin-Rockwell Corp. has declared regular quarterly dividend of 50 cents and an extra dividend of 50 cents, both payable Oct. 1 to holders of record Sept. 22.

Perfect Circle Co. has declared initial quarterly dividend of 50 cents payable Oct. 1 to holders of record Sept. 20.

## Nash Expansion Program to Include All Divisions

KENOSHA, Sept. 18—More than \$2,000,000 in new buildings and equipment will be added to the four Nash plants in Wisconsin. The expansion program will be pushed as rapidly as possible through the fall and winter to increase production as well as to balance output in the four divisions.

All four plants have been operating at capacity since the introduction of the "400" series in June and even though \$2,500,000 was spent at that time in new machinery, jigs and dies, the increased capacity has not been sufficient to keep up with orders.

## Fokker Completes 2 Plants

NEW YORK, Sept. 18—Fokker Aircraft Corp. of America has just completed two additional plants for the manufacture of commercial planes. The larger of these plants, which was started last spring, is now in operation in Wheeling, W. Va., turning out a number of F-X-A Fokker tri-engined, 14-passenger monoplanes, capable of a speed of 150 miles an hour. The second new plant is being operated in Passaic, N. J., thus giving the company three operating plants, the third and original plant being at Teterboro airport, N. J.



### **Jobber's Mechanical Service Department To Be Feature of Tenth A.E.A. Exhibit**

CHICAGO, Sept. 18—Replete with new and additional features, the tenth international exhibit of automotive products to be held in the Coliseum here under the auspices of the Automotive Equipment Association, Oct. 22-27, will be the most interesting ever held by the association. Attendance far surpassing any other previous show is expected.

All spaces for exhibits have been sold and more than 204 firms are to be represented. This heavy demand for space, considered a certain indication of the healthy business outlook in the industry, will necessitate the use of the entire lower floor, the south wing, and the north hall of the Coliseum for display purposes alone.

If arrangements now contemplated are carried out, not only will A.E.A. members exhibit, but members of the Motor & Accessory Manufacturers Association also will have display space at this show for the first time.

Among the novel displays which will characterize this year's show as outstanding is included a model layout for jobbers' mechanical service department. This exhibit will be in actual operation and will show not only ideal arrangements of machinery, stock, display, etc., but will provide a view of the latest types of equipment for such a department.

The "set-up" has been based on actual experiences of A.E.A. members who have been unusually successful in the conduct of a service parts business and a mechanical service department in connection with their wholesale trade.

It is declared by officials of the association that the rapid recognition of the importance of the service parts market has forced a demand in the membership for such a display. In the exhibit will be parts storage systems, turn-over control systems, methods for efficiently handling telephone orders for parts as well as the mechanical features.

Sessions of the thirteenth annual

convention this year will be held in the Stevens Hotel, there being insufficient space at the Coliseum for both the show and the convention. A number of prominent speakers have been listed to appear on the program. Subjects of importance to the industry will be discussed and acted upon and sufficient room for group and committee meetings has been arranged for by the executive committee.

Car manufacturers have been added to the list of those to receive invitations to this year's show. Overseas representatives, as usual, will be admitted, but otherwise the show will be "closed" as in the past. Two dealer nights, however, have been provided, Tuesday and Wednesday, Oct. 23 and 24, and the features of these special sessions will be conducted much as has been the case in past years.

An unusually large number of overseas visitors is assured this year. The Overseas Automotive Club dinner at the Stevens Hotel, Wednesday night of show week, has been planned as one of the leading affairs of the period. Two hundred persons attended the third annual dinner, given in cooperation with the A.E.A. by the club last year and a much larger attendance already has been assured for this year's affair.

All arrangements for the convention proper, officials say, have been made in accordance with trade needs and have been designed to emphasize possibilities of sales expansion in the automotive equipment field.

Details of arrangements for the show and convention have been handled by a committee composed of W. S. Isherwood, chairman; E. H. Seager, F. H. Suter, C. C. Secrist and George L. Brunner.

Greater Market Development will be given a prominent place on the program, the major part of Tuesday having been set aside for the activities of this division. Benefits of the various services will be explained by those most directly affected by it.

### **Swiss Dealers Approve Cars Shipped Unboxed**

WASHINGTON, Sept. 17—Local dealers in Basel, Switzerland, look with favor on automobiles shipped to Switzerland, ready for the road, and unboxed, instead of boxed, as in steamer shipments, according to Department of Commerce advices from consular representatives at Basel.

With the exception of cars delivered from European assembly plants of American companies, most American cars are received in Basel packed in heavy woden cases, which is proper packing for steamer travel but involves considerable expense on the part of local dealers who must not only remove the machines from boxes, replace

the wheels, oil and lubricate the mechanism and adjust brakes and other parts. On the other hand the ready-for-the-road car received from assembly plants is unboxed and involves none of the expense incurred otherwise.

### **Unites Michigan Bus Lines**

DETROIT, Sept. 17—Incorporation papers for Eastern Michigan Motor Buses has been filed with the Michigan Secretary of State. The company will issue 200,000 shares, no par value, and has been organized to take over the various bus lines operated heretofore by the Detroit United Railways. Lines included in the group are: Trunkline Coach and Blue Goose, operating be-

tween Detroit and Toledo; Highway Motor Bus, operating between Detroit, Lansing and Jackson and also between Detroit and Grand Rapids. White Star Motor Bus Co., operating between Detroit and Port Huron, Detroit and Flint, and between Port Huron and Flint; The Wolverine, between Detroit and Mt. Clemens and between Detroit and Imlay City; The Peoples Motor Coach Co., operating between Detroit and Wyandotte and City Service in Flint, Port Huron and Pontiac.

### **New Graham 3-Ton Truck Priced \$1,745 to \$1,970**

DETROIT, Sept. 17—A new 3-ton truck has been announced by Graham Brothers, division of Dodge Bros. Corp. The new model is offered in three wheel-bases, 135 in. for dump bodies, semi-trailers and other heavy duty work; 165 in. for 12-ft. bodies, oil tank service, etc., and 185 in. for 15-ft. bodies, including moving vans and other open and closed bodies for hauling of more bulky commodities. The price range for the chassis is from \$1,745 to \$1,970.

The new truck is featured by four-speed heavy duty transmission and four-wheel Lockheed hydraulic internal expanding brakes. The chassis construction throughout is heavier than any type ever offered by the company. Equipment includes speedometer, ammeter, oil pressure gage, water temperature indicator, thermostat, radiator shutters, crankcase ventilator, gasoline filter, air cleaner and oil filter.

The cabs have been designed to provide driver comfort comparable with that of a passenger car. Seat backs and cushions are of sedan construction, being built over well-padded spring frames. The corner posts are of steel to provide slenderness and strength. The windshields are one-piece construction and equipped with automatic wipers. For convenience, the lighting switch is located above the steering wheel.

### **Franklin Sales Double '27**

SYRACUSE, Sept. 17—With retail car deliveries so far this month 47 per cent ahead of the same period of last month and 102 per cent ahead of the corresponding period of 1927, indications are that this month's business will be the largest September volume in the history of the Franklin Automobile Co., executives have declared. Unfilled orders on the books of the company for export shipment this month are 81 per cent greater than any other September. Dealers' stocks of used cars are low, it is reported.

### **Saxon in Bock Plant**

TOLEDO, Sept. 17—Saxon Stamping Co. has moved into larger quarters in the plant formerly occupied by the Bock Bearing Co. These new quarters give Saxon greatly increased floor space and it has recently added a large number of new presses to its equipment.

## New Keystone Planes Carry 20 Passengers

Craft Will be Used in Trans-  
continental Service—Uses  
Wright Engines

NEW YORK, Sept. 15—The Keystone Aircraft Corp. of Bristol, Pa., has just manufactured four 20-passenger monoplanes for use in transcontinental air service between New York and the West coast. These planes are the largest ever built in America and are equipped with luxurious private compartments and sleeping berths for night flying.

These planes, under the name of Patrician model, carry a powerplant of three Wright Cyclone engines developing a total of 1575 hp. The high speed of these planes is 155 m.p.h., with a cruising speed of 135 miles and a service ceiling of 16,100 ft. They have a 90-ft. wingspread.

When loaded with 4½ hours fuel, 18 passengers and 1000 lb. of baggage, express or mail the Patrician will weigh 15,000 lb. By sacrificing a portion of the baggage and fuel space provisions can be made for six additional passengers.

A private sleeping compartment large enough for the installation of a standard size berth is built in the forepart of the cabin, with provisions for hot and cold water and toilet facilities.

The main cabin is 6 ft. square in cross-section and 19½ ft. long and is fitted with 18 chairs arranged in six rows, three abreast, with an aisle running lengthwise. Dome and wall lights are installed for reading during night flights. Continuous glass panels comprise a large portion of the sound-proof surface, offering the highest visibility. A radio is installed aboard the Patrician with a loud speaker in the roof for reception of ground programs or it may be switched over so that comments from the pilot can be heard by the passengers.

A panel for flying instruments, constructed on a large scale by the Pioneer Instrument Co., is mounted in the front of the cabin so that passengers can have ready information as to altitude, air speed and time. The pilot's instruments also are supplied by the Pioneer Instrument Co.

## To Build Regina Plant

TORONTO, Sept. 17—Prest-O-Lite Storage Battery Co., Ltd., Toronto, will build a branch factory in Regina, Sask. The company has entered into an agreement with General Motors of Canada, Ltd., to supply its requirements of storage batteries for cars produced in the new assembly plant. The General Motors requirements and the Prest-O-Lite business in Regina will make necessary a plant capable of producing from 50,000 to 60,000 automotive storage batteries per annum.

## First Coach Sleeper Operates in England

WASHINGTON, Sept. 15—The first highway motor coach sleeper service to be operated in Europe has been inaugurated between London and Liverpool, the Department of Commerce is advised. The service is conducted by the Albatross Roadways, Ltd., with, at present, one forward control Daimler chassis carrying a twelve-berth body. If conditions justify it, this company has announced, the London-Liverpool service will be augmented with additional rolling stock and other routes from London will be opened.

## Williams Interests Buy Vulcan Aircraft Control

PORTSMOUTH, OHIO, Sept. 15—Through a deal closed this week, Forest Williams and Graves Williams became sole owners of the Vulcan Aircraft Co., this city, producer of the Moth airplanes. The plant was established about six months ago by the present owners and W. J. Burke, president of the Vulcan Last Corp., who died recently. The purchasers took over the Burke holdings and will operate the company in the future.

The scope of the plant will be broadened and the output will be increased. About a dozen planes are now in process of construction. One of the planes was in the aerial derby from New York to Los Angeles and arrived in third place.

## Chamberlin to Purchase Factory in Jersey City

NEW YORK, Sept. 15—Clarence D. Chamberlin, who has been planning for some time to go into the manufacture of airplanes for passenger use, has signed a contract to purchase a factory in Jersey City, according to announcement by a real estate broker.

This factory is the Chadwick cotton mill property of the Clark Thread Co. and the buildings cover 120,000 sq. ft. The property contains 10 acres and is assessed \$249,600. According to report it is planned to use this plant jointly for the Chamberlin Aeronautical Corp. and the Crescent Aircraft Corp., now located at Lindhurst, L. I., of which Mr. Chamberlin is technical designer and director.

## Pontiac Buys Airport Site

DETROIT, Sept. 17—The City of Pontiac purchased 160 acres as the site for a municipal airport Tuesday. The purchase price was \$130,500. Steps will be taken immediately to get the property in shape and to build a hangar in six weeks.

## Timken Organizes Steel Subsidiary

Will Manufacture Steel and  
Tubing for General In-  
dustrial Market

CANTON, OHIO, Sept. 17—Announcement was made this week of the formation of the new Timken Steel & Tube Co., which was incorporated under the laws of Ohio several weeks ago. The new company, which is a subsidiary of the Timken Roller Bearing Co., will take over the manufacture and sale of Timken steel and tubing.

Officers of the new organization are H. H. Timken, chairman of the board; M. T. Lothrop, president; J. W. Spray, vice-president; A. J. Sanford, vice-president in charge of sales; J. E. Daily, vice-president in charge of operations, and J. F. Strough, secretary and treasurer.

Headquarters for the new concern will be in Canton with the mills also located here in part of the old steel mills and in the new buildings now under construction at the Timken plant.

It is expected that most of the new buildings at the plant will be finished in October and that the entire plant will be in operation not later than November and will employ approximately 200 skilled workmen. It is understood that the expansion of the Timken concern which involves the formation of the new company will cost approximately \$4,000,000.

The Timken Steel & Tube Co. will maintain headquarters in Chicago, Los Angeles, Detroit and New York, it was announced.

The company has been organized to take care of the growing demand for Timken steel among automotive manufacturers and manufacturers of various other products, by the production of high grade alloy steels on a quantity basis. Its production facilities consist of the most modern furnaces and mills with a capacity of 30,000 tons of steel a month.

## Makes Motorcycle Shield

SPRINGFIELD, MASS., Sept. 17—A new handlebar windshield for motorcycles is being put in manufacture by the Springfield Upholstery & Metal Works. In addition to the permanent windshield of thick pyroxylin it carries a legshield attachment of stout khaki for the protection of the rider in cold weather. Some Indian machines are being equipped with this combination.

## California Registry 1,734,577

SAN FRANCISCO, Sept. 17—California has 1,734,577 motor vehicles registered, according to the latest figures announced by the California State Automobile Association. Of these 1,491,923 are passenger cars, 199,468 are trucks, 8542 motorcycles and 34,644 trailers.



## Durant Offers New Four and Six Lines

Prices on Six Are Reduced \$30 to \$40—Offering Hastened by Large Sales

ELIZABETH, N. J., Sept. 22—Durant Motors, Inc., announced this week a new Durant Four and a Durant Six Series 60. Originally it had been intended to announce these models at the time of the New York automobile show. In May the Durant company slowed down on the production on its current models, in the expectation that the demand would slacken during the summer months. But sales continued at an unexpectedly high level throughout the summer, with the result that early in September dealers' floors were cleared of stocks of the two most popular Durant models, and the expediency of advancing the announcement date was recognized.

The Durant Four line for 1929 consists of four regular and two de luxe models which are priced as follows: Roadster, \$595; coupe, \$595; two-door sedan, \$595; four-door sedan, \$695; de luxe roadster, \$675, and de luxe four-door sedan, \$775.

The Durant Six Series 60 line comprises the following models: Roadster, \$755; coupe, \$755; two-door sedan, \$765; four-door sedan, \$845; de luxe roadster, \$845; de luxe cabriolet, \$895, and de luxe four-door sedan, \$935. The prices on the standard models of the 60 line represent reductions from \$30 to \$40 as compared with the previous Durant 55 line, to which the new Series 60 corresponds. There were no de luxe types last year.

Prices on the four line are unchanged.

### Body Construction Changed

Among the improvements made in design emphasis is laid on a stiffening of the bodies which is claimed to make them squeak-proof and rattle-proof. The important joints of the body are tenoned, glued and screwed, and steel braces or reinforcements are liberally used. The hoods are now made with double banks of louvres set in raised panels.

Chromium-plating has been adopted for all exterior bright parts. Cowl lamps are now standard, as are combination stop and tail lights.

On the Four, the Continental-built engine is now rubber-mounted to absorb engine vibration before it reaches the frame.

On the Sixty, the wheelbase has been increased from 107 to 109 in. to permit the use of a more roomy body and increase the riding comfort. The engine of the Sixty now has a Lanchester vibration damper. The instrument boards have been redesigned for more harmonious appearance. A 17-in. flat top steering wheel is now fitted, and spark and throttle levers are on top of the steering wheel.

## 230 Miles of Road Built in Sao Paulo

WASHINGTON, Sept. 15—Brazil's progress in highway construction, as noted by the Pan-American Union here, is demonstrated by the recent completion of a modern highway southward from Sao Paulo almost to the border of the adjoining state of Parana, a distance of about 230 miles. A short time ago a highway was completed linking the cities of Rio de Janeiro and Sao Paulo, separated by 300 miles.

## Beecroft Shows Changes in Car Servicing Field

NEW YORK, Sept. 15—The Automotive Service Association of New York opened its 1928-29 season with a meeting at its new headquarters at the Park Central Hotel this week. More than 250 members attended this session, following a dinner at which something over 100 members were present.

David Beecroft, the speaker of the evening, took as his subject the changes that have taken place in all industry during the past five years and followed with an analysis of the changes that have taken place and are taking place in the service division of the industry. Attention was drawn to the new combinations for giving service, such as the combination in one establishment of such lines as brake service, wheel alignment, greasing, battery, tires and washing. New companies in the service field have been rapidly developing and giving service of this nature.

The development of the warehouse system in better serving the motor vehicle repair shop, etc., by virtue of the quicker distribution of parts to these retail repair outlets, was also stressed.

C. B. Warren, president of Warren-Nash, spoke briefly to the members of the association.

## I.H.C. Buys Willys Plant

ST. PAUL, Sept. 17—The Willys-Overland assembly plant here has been sold to the International Harvester Co. and Overland is looking for branch headquarters space elsewhere. Shortly after the building was erected it was taken over for a war training school by the Army. For several years it was the scene of the annual Northwest Automobile Show.

## Ford Oregon Plant Resumes

PORTLAND, ORE., Sept. 17—The Ford assembly plant here resumed operations after 15 months of partial activity, according to Clarence A. Bullwinkel, branch manager. Two hundred and fifty employees will hereafter be engaged in turning out an average of 75 cars daily.

## Curtiss Subsidiary Orders 150 Planes

Company Negotiates for Flying Fields and Plans Early Operation of 25

NEW YORK, Sept. 17—Curtiss Flying Service, Inc., recently organized to conduct air passenger service between various cities and to act as sales agent for the Curtiss Aeroplane & Motor Co., Inc., has placed an initial order for 150 airplanes of various types to involve an expenditure of approximately \$2,000,000, according to announcement made by C. M. Keys, chairman of the board of directors. This is reported to be the largest private airplane contract ever placed in the United States.

Officers of the company are now negotiating for the acquisition of flying fields, either by purchase or lease, in the key cities of the country. Of these, 25 fields will be operated at the start, each of which will house a complete training school for aviators and a sales and service station.

## Transcontinental Line Buys Ten Ford Planes

DETROIT, Sept. 17—Ford Motor Co. received its largest single order for airplane equipment from the Transcontinental Air Transport, Inc., when C. M. Keys, president of the transport company, placed an order for 10 all-metal tri-engined monoplanes at a cost of \$650,000. The Ford planes will be used by the Transcontinental for its combination airplane and train service from New York to Los Angeles, in connection with the Pennsylvania and Santa Fe Railroad systems.

Major Thomas G. Lanphier, who resigned recently from the United States Army Flying Corps to join Transcontinental as general manager in charge of operations, came here from New York, where he has been familiarizing himself with the organization work started by Keys and Col. Charles A. Lindbergh, chief advisory counsel of the new airline.

## Gardner Exports Increase

ST. LOUIS, Sept. 17—Export shipments by Gardner Motor Co., Inc., in August increased 90 per cent over August last year. Orders on hand for September shipment show an increase of 244 per cent. The company has signed distributors in London, Bucharest, Sidney, Guatemala City, Mexico City and Toronto during the past month.

## McAdams Moves Plant

NEW YORK, Sept. 17—J. C. McAdams Co., manufacturer of radiator shutters and locking devices, formerly located in Long Island City, has moved to New Britain, Conn.

## Automotive Buying to Set Steel Mark

Industry's Steel Bill Now Exceeding Building Construction and Railways

NEW YORK, Sept. 20—Whether the steel industry's 1928 record will set a new high mark for production, measured in terms of theoretical ingot tonnage, or whether demand during the year's final quarter will upset this calculation, it is certain that a new high level will be established in 1928 for automotive consumption of rolled steel products. So obvious is this that those who in former years were wont to depreciate the importance of the automotive industries as tonnage consumers of steel are now paving the way for a surprise in the percentage of steel output absorbed.

Figured in dollars and cents, the steel bill of the automotive industries has for some time exceeded that of the building and construction industries and railroads which are credited with being the heaviest tonnage consumers, but which buy relatively crude forms of steel as compared with the automotive industries.

Sharp advances in the non-ferrous metal markets this week, together with the continuing efforts of steel producers to improve selling prices on some products, brought consumers more sharply face to face with the problem of rising material costs.

Full finished automobile sheets continue to come in for heavy demand and specifications, the 4.00 cents price level ruling firm. On the whole, third-quarter prices apply to what fourth-quarter business has been placed for both hot and cold rolled strips.

**Fig Iron**—Until 1929 buying parts, demand from automotive foundries is expected to be largely for filling in, most melters, especially the larger foundries, being well covered over the remaining months of the year. So far no 1929 prices have been named by sellers.

**Aluminum**—While the advance in the copper market tends to stiffen prevailing aluminum prices, there is nothing to indicate any early change in the price situation. Last year a price reduction was made late in October.

**Copper**—On Sept. 15, producers promulgated the long expected advance to 15 cents, delivered Connecticut Valley, and 15 @ 15½ cents, delivered Middle West. Prices of all copper and brass products were raised ¼ cent by the leading interests. It is stated that the advance was not favored by all producers.

**Tin**—If England has to pay higher prices for copper, the United States must expect to pay higher prices for tin. That was always the case, and in a moderate way the bull movement has already set in.

**Lead**—The leading producer raised its contract price \$2 per ton the first of the week, the rise stimulating demand.

**Zinc**—The market's undertone is stronger in sympathy with the general trend of non-ferrous markets.

## "Gold Mine Bridge" to End Toll Oct. 1

BALTIMORE, Sept. 19—A parade in which more than 1000 decorated automobiles will take part will mark the lifting of tolls on the Havre de Grace-Perryville Bridge, over the Susquehanna River. It has been announced that the toll will be eliminated beginning Oct. 1. For years the bridge has been known as the "Gold Mine Bridge." The state purchased it several years ago and continued the toll until it was paid for. Then it was remodeled into a double-deck structure, the toll being continued to pay for the improvement. The total cost was about \$1,000,000.

## Says Liability Insurance Must Meet Public Need

NEW YORK, Sept. 17—Automobile liability insurance as at present handled will force the extension of the state compensation insurance measures unless changes are made in the form, according to Charles E. Clapham, manager of the New York Public Automobile Accident Prevention and Statistical Bureau.

This type of insurance in its present form infers by its terms that victims of loss through automobile accidents must "get it if you can." Mr. Clapham goes on to indicate that state compensation insurance measures are being advocated in Massachusetts as the best solution of the controversy which has arisen there but regards it as an incorrect solution of the problem.

"The business of insurance," he said, "should be left to private enterprises the same as every other form of business. If it is made a matter of self-protection the state will, of course, be obliged to embark in the insurance business. It is a proposition for the casualty insurance industry to consider seriously. The exigency must be met and if the industry is not inclined to give the public the protection which it demands then there is no alternative but state insurance."

## Arrange Aircraft Show

PHILADELPHIA, Sept. 18—The first annual Philadelphia aircraft show will be held Nov. 3 to 10 in the 108th Field Artillery Armory under the auspices of the Aero Club of Philadelphia. Ray Krimm, 1414 South Penn Square, is director.

## C. F. Hotchkiss

BINGHAMTON, N. Y., Sept. 17—Funeral services were held this week for Clarence F. Hotchkiss, president of the Stowe Mfg. Co., Inc., this city, who died Sept. 9.

## Vauxhall Revises Prices and Design

Increases and Decreases Are Made in New List—Fabric Sedan Added

LONDON, Sept. 15—Prices of Vauxhall cars for 1929 show considerable variations, increases applying to some models and reductions to others. Thus the "Bedford" sedan, the lowest-priced closed car, is to be £520 instead of £495, while the "Kimberley" de luxe sedan is reduced from £695 to £650. The range of bodywork is increased by the addition of a fabric sedan, a four-window type with flexible framing, priced at £555. Numerous minor variations have been made in the chassis design; among other alterations the bore of the six-cylinder engine has been increased from 73 to 75 mm., though the stroke remains unchanged at 110 mm. In addition to this increase of bore, certain other alterations have had effect in increasing the power output; a new shape of combustion chamber and invar-strut pistons have justified a higher compression; the induction and exhaust tracts have been improved, while the camshaft has been redesigned to improve the acceleration.

## Lanchester Builds Eight

LONDON, Sept. 15—It is announced that the Lanchester Motor Co. will introduce at the Olympia Show a new chassis model with the straight-eight engine. The latter, with a piston displacement of 270 cu. in., has the same bore and stroke (3¼ x 3½ in.) as the 21 hp. six, and the chassis layout follows the latter model with an overhead camshaft, single-plate clutch, four speeds, enclosed propeller shaft, worm drive, tubular front axle, semi-elliptic front and cantilever rear springs, screw and nut steering gear, and four-wheel brakes. The wheelbase is 142½ in., and the track 56 in., while the chassis price is £1,325.

## Finnish Imports Higher

WASHINGTON, Sept. 20—During the first seven months of 1928, automobile and chassis units imported into Finland amounted to 6762 as compared with 6352 for the corresponding period of 1927, according to the Department of Commerce.

## Chrysler-Dodge Output 500,000

DETROIT, Sept. 20—Combined output of the Chrysler Corp. and Dodge Bros. Corp. in 1928 will be approximately 500,000 cars and trucks, according to K. T. Keller, vice-president and general manager.

## Brubaker Equips Byrd

MILLERSBURG, PA., Sept. 18—W. L. Brubaker Bros. & Co. has installed all the tool equipment for the Byrd Antarctic expedition.



## Ford Dealers Join to Handle Lincoln

LOUISVILLE, KY., Sept. 17—Greater Louisville holders of Ford dealerships have formed the Consolidated Motors Co., Inc., with a capital of \$50,000 and liability limit of \$500,000, for the purpose of taking over the Lincoln automotive dealership here which previously had been exclusively handled by the George Cole Motor Co. Each of the Ford dealers will become financially interested in the new company.

Some years ago the various Ford dealers in Louisville also handled Lincoln cars. About three or four years ago the Lincoln dealership was given exclusively to the George Cole Motor Co., and since that time the Ford dealers have not been interested in Lincoln sales. It is reported that the same policy of consolidated interests have been developed very successfully in some other cities, and it is believed that it will work out very satisfactorily in Louisville, where all Ford dealers will now be interested in developing Lincoln sales.

## Ford Foreign Assembly Extended to New Plants

DETROIT, Sept. 15—Production of the new Ford car in foreign plants is being materially increased, according to the Ford Motor Co. Besides plants at Manchester, England, Antwerp, Belgium, and Barcelona, Spain, which have been in operation for several months, the assembly plant near Berlin-Plotzensee, Germany, operated by the Ford Motor Co. A. G., began operations in August and the plant at Sao Paulo, Brazil, is opening this month. Present plans also include the starting of assembling at the Yokohama, Japan, plant some time during September.

### Coming Feature Issues of Chilton Class Journal Publications

Oct. 10—Marketing Annual for 1929—Motor World Wholesale.

Nov. 17—Production and Factory Equipment Issue—Automotive Industries.

## Pierce-Arrow Increases Production Schedules

BUFFALO, Sept. 17—Increased demand for the new Pierce-Arrow series 81 motor car has exceeded factory expectations and production schedules have been revised. Orders for additional quantities of materials have been placed so as to insure no interruption of production during the coming months. The materials are for both lines of Pierce-Arrow cars.

According to a report made by the sales department of Pierce-Arrow Motor Car Co., indications are that Pierce-Arrow sales for September will eclipse the record business of July and August. During the first 11 days of September shipments from the factory were double those for the same period last year. Unfilled orders on the books are now more than three times as great as one year ago.

## Toledo Employment Gains

TOLEDO, Sept. 17—Employment in Toledo automotive plants continues more than 50 per cent above what it was a year ago. Fifty-one plants which report weekly had 33,909 employees on payrolls this week. At the same time a year ago there were 21,799 workers in same plants. Employment slumped in July but in the last three weeks has been on the upward trend.

## Abrasive Standards Are Now Effective

WASHINGTON, Sept. 17—Following the approval of a tentative simplified practice recommendation for coated abrasive products, by a general conference of all interested elements of the industry, the division of simplified practice of the Bureau of Standards, Department of Commerce, circularized the producers, distributors and users of the commodity for signed acceptances to the recommendation.

The division of simplified practice has just announced that this project is now in effect, as of Sept. 1, 1928, since a sufficient number of signed acceptances, representing at least 80 per cent by annual production, have been received from the industry. At the time the project was considered by the general conference, it was stipulated that industry would have until January 1, 1929, to get rid of stock manufactured previous to the promulgation of the simplification, which is known as Simplified Practice Recommendation No. 89, Coated Abrasive Products.

## C. I. T. Has 80 Branches

NEW YORK, Sept. 15—Commercial Investment Trust Corp. has opened local offices in Jersey City, N. J., Greenville, S. C.; Erie, Pa.; Nashville, Tenn., and at Poughkeepsie and Utica, N. Y., thus raising the number of complete branch offices to 80. This number does not include its foreign activities. Each of these offices is a completely functioning company wholly owned by the corporation.

## Hayes Gets Reo Order

LANSING, Sept. 17—Hayes Body Corp. has received renewal orders for next season's requirements of Flying Cloud bodies from the Reo Motor Car Co.

# Calendar of Coming Events

### SHOWS

Aeronautical Exposition, Coliseum, Chicago .....Dec. 1-9  
American Road Builders Association, Inc., Cleveland Auditorium.....Jan. 14-18  
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-12  
American Welding Society, Commercial Museum, Philadelphia .....Oct. 8-12  
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27  
Berlin .....Nov. 8-18  
Boston, Mass., Mechanics Bldg.....March 2-9  
Brussels .....Dec. 8-19  
Buenos Aires .....Nov. 29-Dec. 9  
\*Chicago, National, Coliseum, Jan. 26-Feb. 2  
International Aviation Exposition, Berlin .....Oct. 8-28  
London, passenger cars .....Oct. 11-20  
Montevideo .....Nov. 10-19  
National Standard Parts Association, Cleveland Auditorium.....Oct. 29-Nov. 3  
\*New York, National, Grand Central Palace .....Jan. 5-12  
Paris, passenger cars .....Oct. 4-14  
Paris, trucks .....Nov. 15-25  
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 26-Feb. 2  
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles .....Feb. 9-16

\* Will have special shop equipment exhibit.

Salon, Los Angeles Motor Car Dealers Association, Biltmore Hotel.....Oct. 17-20  
Salon, Automobile Salon, Inc., Hotel Commodore, New York .....Dec. 2-8  
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco.....Feb. 23-Mar. 2  
Western States Metal and Machinery Exposition, Los Angeles.....Jan. 14-18

### CONVENTIONS

American Gear Manufacturers Ass'n, Statler Hotel, Buffalo, N. Y.....Oct. 11-13  
American Institute of Mining and Metallurgical Engineering, Metals Division, Benjamin Franklin, Philadelphia .....Oct. 8-12  
American Road Builders Ass'n, Inc., Cleveland Auditorium .....Jan. 14-18  
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-12  
American Society for Steel Treating, Semi-Annual Meeting, Los Angeles .....Jan. 14-18  
American Welding Society, Commercial Museum, Philadelphia .....Oct. 8-12  
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27  
International Air Conference, Washington .....Dec. 12-14  
Mid-West Motor Truck Transportation Congress, Indianapolis.....Oct. 23-26

National Highway Congress, Mexico City .....Oct. 3-6  
National Metal Congress, Los Angeles .....Jan. 14-18  
National Research Council, Washington .....Dec. 13-14  
National Safety Council, National Congress, New York .....Oct. 1-5  
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3  
Society of Industrial Engineers, Rochester, N. Y.....Oct. 17-19

### A. S. M. E.

Cincinnati, Oct. 22-25—Machine Shop Practice.

### S. A. E.

#### National

Chicago, Dec. 6-7—Aeronautic.  
Detroit, Book-Cadillac, Nov. 22-23—Production.  
Detroit, Book-Cadillac, Jan. 15-18—Annual.  
Newark, Robert Treat Hotel, Oct. 17-19—Transportation.  
New York, Hotel Astor, Jan. 10—Annual Dinner.

#### Sectional

Cleveland, Sept. 29—Outing.

### RACES

Salem .....Oct. 12